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*Old Halls in Lancashire and Cheshire.**

THE work brought out under this title by Mr. Henry Taylor, whose "Notes on Sketching Tours" we formerly had occasion to notice favourably, is one of those that is, or should be, as interesting to the generally cultivated reader as to the architect. The general reader, especially if he be of an antiquarian turn of mind (a supposition which perhaps takes him out of the "general" catalogue), cannot fail to find interest in the history and illustration of so many old family houses, connected in some cases with names that have been eminent in English domestic history, and perhaps in public history also. The architect finds here interesting examples of effective and picturesque planning, and still more interesting suggestions in architectural grouping and effect; suggestions which are capable of adaptation and modification in styles of building and with materials widely different from those which are here illustrated.

To have illustrated every old hall of the kind in the two counties named would have been, we can well believe, a too onerous task for any one who had not his whole time to give to it. The author tells us that he has therefore selected for description a limited number of interesting or typical examples, and endeavoured to trace the architectural history of the several buildings in such a manner as to illustrate as much as possible the development of English domestic architecture in general. This latter aim is, perhaps, hardly carried out, and hardly could be in the course of separate and rather brief notes in reference to a number of structures possessing many leading traits in common; but some degree of generalisation is effected in regard to a portion, at least, of the subject.

Mr. Taylor commences, for instance, by giving some block plans of what he recognises as the leading types of plan in the houses of which he is speaking. Six types are thus distinguished, of which, however, one or two seem little more than variations resulting from economy. The tendency of the buildings to form some portion of the sides of a quadrangle is obvious in nearly all of them. In the earliest and simplest type given, where parlour and kitchen departments form the two wings, connected by the hall as an intermediate "curtain," we have what seems the embryo suggestion of the quadrangle plan, the two wings just sprouting into arms which, if extended, would make the second and third sides of the "quad." Then we have the three-sided quadrangle, with open space on the fourth side; the two-sided, in the shape of the letter L, sometimes the result of the pulling down of a formerly existing third side; and we have the complete quadrangle, that picturesque, comfortable, but (on a small scale) distinctly unhealthy form of planning, forming in hot weather a central reservoir for the air to stagnate in. The dates of these buildings are mostly between the Late Gothic and the Jacobean period; a few remnants going as far back as the fourteenth century. The other generalisation which the author gives us is in regard to the sites of these old dwelling-houses; and here he touches upon a point which is the more interesting because it is commonly overlooked. Although we have descended, in our present study, below the age when the castle dominated everything, we are still in times very turbulent and deficient in police as compared with our own, and the houses of the period are built not without regard to the defensibility of the site; indeed Mr. Taylor suggests that this was a matter much more thought of, and more carefully looked to, than any consideration of picturesque effect, and there is no doubt that in this respect he is right. The idea of placing a house picturesquely is probably an essentially modern one; the ruling motives in the fifteenth and sixteenth centuries would be much more convenience of water-supply and security from attack except with considerable advantage of position to those attacked. The author divides the sites, as regarded in this light, into those naturally defensive, such as those on the brow of a hill or within the sharp bend of a river; those which are naturally defensive but improved by art; and those which are made defensive by art alone, such as moated houses on flat sites. The latter are, however, the most numerous class; the sites which required isolating by a moat and drawbridge being, probably, the most convenient of access for friends, and the moat offering a sufficient stumbling-block to foes. The author also draws attention to the "folds," which word represents, in the districts of which he is writing, a small collection of farmhouses, grouped together in a quadrangle for mutual defence and security; the doors of separate tenements all opening inwards on to the quadrangle, which thus displayed only one vulnerable point at the general entrance. This defensive element in the arrangement of ancient homesteads, whether manor-houses or farms, is overlooked by many, but it is an interesting item in the study of old English domestic architecture.

The real interest of these old English houses to the architect, however, lies in their picturesque treatment and arrangement, and the numerous suggestions which they offer to the designer. A large number of the buildings given here belong wholly or partially to that half-timber manner of building which offers so much natural opportunity for varied and effective arrangement of materials; but there are others which, without this extra source of effectiveness, present nearly as varied and effective a treatment with a more solid method of building. In order to give as complete an illustration as possible of the whole disposition of these buildings, they are mostly shown in bird's-eye views. On any other scheme a considerably increased number of drawings would have been requisite to show the whole building, and the expense of production, as well as the bulk of the book, materially increased. The object has been, in fact, not to make pictures in the first instance, but to convey a correct idea at a glance of the disposition and arrangement of the buildings, for which the only expedient is a bird's-eye view.

Among the more solidly built of the examples which are thus exhibited to the reader, in which the half timber method is not used, one of the most interesting and characteristic is Hoghton Tower, as the author describes it, "a picturesque, sturdy-looking pile of buildings, situated on the summit of a lofty eminence, midway between Preston and Blackburn, which is a conspicuous object in the landscape for many miles around," and appearing, on closer inspection, "more like a village than a private residence." On three sides the ground slopes away rapidly, on one side being precipitous; on the fourth side, where the ground is more level, the whole is defended by a battlemented gatehouse and angle-towers, the fenestration of which, by the way, is much more symmetrical than is often found in such buildings. The gatehouse gives access to a large court, flanked by buildings for stabling, kitchens, and retainers, and on the further side is the entrance to the mansion proper, up a flight of semicircular steps and through a gate flanked by massive piers with the favourite stone ball decoration at the top, leading to a

* Old Halls in Lancashire and Cheshire; including rider on the ancient domestic architecture of the Counties Palatine. With numerous illustrations. By Henry Taylor, Architect. Manchester: J. E. Cornish. 1884.

second enclosure, and along a kind of causeway and up a further flight of steps to the actual house, which again forms a quadrangle enclosing a square court. In the angle is the chapel (or the remains of it), which in the desire for correct and honest ornamentation was canted somewhat askew from the main lines of the building. The further side of the quadrangle included "King James's rooms," where James I. stayed in 1617 with Sir Richard de Hoghton, and had a fine time of it in hunting and feasting. In the arrangement of this fine and interesting old house we seem to see, in a more quiet and picturesque form, and with less gloomy expression, the same idea which presents itself to the great French châteaux; the defensive part of the house without, in the shape of massive towers, and the real habitation within the lines of these defences. Enough is shown of the inner or house court in the view, though on a small scale, to let us see that this is one of those examples of picturesque expression, in the grouping of windows and other features, which renders these old English houses such a series of studies for the architect.

This quality of effective and expressive grouping, in fact, is that which always interests us most in this class of buildings. It is difficult to say how far this kind of effect was really intentional on the part of the builders, how far it was merely the result of a *naïve* and unpretending way of building. The plans of the large dining-halls, for instance, are charming examples of effective planning of rooms, with their large bays added often transept-wise, showing how directly social distinctions and the desire to seclude one portion of the party a little from the other, found their direct and natural expression in the architecture. The bays, Mr. Taylor says, were partly used for the effective display of plate, partly also, he thinks, and we should be disposed to think so too, as places of collection for the ladies, a little apart from the more mixed company that would often have filled the hall. In some cases all the window treatment, if one may use the expression, seems concentrated on these bays, the rest of the hall having smaller windows at some distance from the floor, the bay alone having a large extent of window brought nearly to the floor, sometimes being almost entirely one great window. The height of the windows from the floor, in many of the principal rooms, is a point of difference between ancient and modern house building to be remarked; in these days of low windows it is difficult to realise the difference of living in a house where one could not see through the windows without climbing on a chair; but blinds were not in use then, and high windows were desired for privacy. Mr. Taylor finds in the high windows another advantage, that the effect of the interior lighting is better; the shadows fall in a natural manner, instead of being cast upwards from below. How many people in the present day would give up the opportunity of looking through the window for the sake of getting the light to fall rightly in the interior, we cannot say; we are not among those enthusiasts for true and logical chiaroscuro. But the plans of the large dining-halls, of which several are grouped together on one plate, are delightful; with their great ingle-nooks, large bays added in different ways and at different parts of the room as fancy dictated, and the elaborate carved screens which in many of them separated the hall from the entrance passage, they represent the poetry of room-planning.

The hall was the great feature of the interior; but everywhere throughout the exterior of the houses shown in this volume, as well as in others of a similar class and date, we are struck with the prevalence of that feeling for accentuation, whether conscious or unconscious, which makes the great distinction between old and modern house-building, with the exception of recent special efforts in that direction. Of late some people have learned the lesson and repeated it by rote, probably in a far more conscious spirit than it was done by our forefathers; but even this intentional and antiquarian expression is not very often to be found in modern country houses or "halls." The note of modern house-building is staid respectability, an absence of expression; one window like another, or one row of windows, at least, like another; nothing to fix the eye on this or that point, or to indicate that the builder or architect took a pleasure in concentrating architectural treatment on any special feature. Now the reverse of this is what especially strikes one in turning over the pages of a book of illustrations of old houses like the one before us. Everywhere we find incident in the buildings, a grouping of the features, a marking out of some points by a special treatment. More especially is this shown in the arrangement of the windows, the eyes of a house, on which so much of its expression depends. So also in regard to the use of half-timber work, which a little while since, at least, was regarded as in itself, and in any form, a receipt for the picturesque. But it is not used in this blind haphazard way in the old buildings. It is either the method employed for the whole building, and treated with great breadth of effect; or it is concentrated where it has special convenience or meaning, constructively or architecturally. Thus, in Agecroft Hall, the whole building is half-timbered, but in a plain and utilitarian manner on the exterior, with the chimney piers alone built solid and running up unbroken through this mass of post and pan work, like the main supporting skeleton of the building. On the inner side, next the quadrangle, the character of the half-timber work is altered, and becomes more ornate. In Ordsall Hall, on the same page, the varied arrangement of bays and projections is charming, and completely expresses the difference between the show portion and the working portion of the interior. In Royle Hall and Gawthorpe Hall we are almost as much pleased by the simplicity of the architectural treatment, the windows put just where they are wanted, without pretence of systematic arrangement. In "The Lodge, Royle," we see the mullioned windows carried into the horizontal bands right round the three sides of a square projection; and in Belfield Hall the arrangement of the mullioned windows in long groups gives a special and most charming expression to a building which is constructed architecturally out of the simplest materials.

Among other interesting points in the book may be specially named the representations of the remarkably sumptuous wood-work in Rufford Old Hall, and the geometrical drawings of the timber framing (plate xxx.) in Smithells, Baguley, and Garret Halls. This should have a scale, by the way. The author draws attention to the great size of the oak pieces used at Baguley; "it will be seen that the head of the east doorway is cut out of a piece of oak nearly 3 ft. wide, the main upright posts out of timber 2 ft. 6 in. wide." It is not "seen," because there is neither scale nor figured measurement, though we take the author's word for it. He remarks that this building "affords a proof of the great durability of oak, for the timbers here are in splendid condition." Speke Hall, one of the finest and most sumptuous of the Lancashire halls, is inadequately illustrated by a very small bird's-eye view; it would have been worth while to have given more space to it. However, we may thank Mr. Taylor for a charming and very valuable book, and may conclude by giving further publicity to one recommendation in it, namely, that local antiquaries might do great service if they would follow the example of Mr. G. H. Rowbotham, who has kept for some years an album for the collection of engravings, sketches, and documentary evidence of every kind relating to Ordsall Hall, in his neighbourhood. Similar collections in regard to other such old houses would have great and increasing value, as the progress of time and decay bring about inevitable alterations and repairs.

Kilburn.—Mr. J. Avery's tender for the ornamental wrought-iron grilles, gilt and completed, for the Church of St. Augustine, Kilburn, according to the designs of Mr. J. L. Pearson, R.A., has been accepted, at the sum of 325*l*.

THE SANITATION OF TOWNS AND DWELLINGS.

AN ably composed manual* on the elementary principles of sanitation as applicable to towns and dwellings has been recently issued by the publisher, Baudry, of Paris, compiled by M. A. Wazon, who takes for his motto the aphorism of Pasteur,—"It is within the power of man to extirpate diseases of parasitic origin." The work is divided into six parts, and treats of water supply and distribution; surface drainage; public ways; sewers, and the utilisation of sewage. In the words of the author, "Taking pure water from its different sources of supply we distribute it in the various parts of a dwelling, then following this water when fouled by domestic use we discharge it upon the public way, where it is joined by the foul water from surface drainage; we follow this admixture of polluted water into the network of the public sewers; we carry the sewage to the places where it is utilised and purified; and, finally, after undergoing process of purification, we restore the water to the river in a condition of purity closely approaching that which it possessed primarily, applying thus continually the cardinal principle of constant circulation."

The first portion of the work is devoted to a consideration of the water supply of towns and dwellings in which the principles which should guide the arrangements of this most important branch of sanitation are set out with great perspicuity, with references to the best authorities, English and foreign. It is a satisfaction to find that among these authorities, English and American authors are those most frequently cited. The injurious effects upon health through the contamination of water by public cemeteries are pointed out, and the evils resulting from the use of water from shallow wells, and the storage of water in cisterns, are clearly demonstrated. Artesian wells, as a source of supply, are held to be unsuitable for towns on account of their cost and the fluctuations in the yield, temperature, and composition of the water furnished from these wells which renders it unfit for general use. A constant supply of water from fully-charged mains is considered by most authorities as the only provision suitable for large towns. As regards the minimum quantity of water necessary for health our author fixes the amount at 180 gallons a head a day, which is considerably in excess of what has been hitherto considered to be requisite. The total quantity of water from all sources available for Paris is stated to be about 100 millions of gallons per diem. In 1876 the population of Paris was about 1,988,000 inhabitants; in 1881 it was 2,240,000, or nearly 2¼ millions, showing an increase of 232,000 in five years, and if this increase should continue in the same ratio, it is probable that in 1886 the population will be about 2½ millions, and unless the present water supply is increased, there will be then only 40 gallons of water per head. Marseilles appears to enjoy an abundant water supply, the provision being equal to 180 gallons per head a day. The London water supply is at the rate of about 33 gallons per head a day. About 110 millions of gallons are daily pumped into London, but of this amount it is probable only about one half is consumed, the rest being wasted.

The total quantity of water obtainable in the case of a state of siege in Paris is stated to be 90 gallons per head a day, from which it would appear that Paris, in the time of war, is nearly three times better off as regards water supply than London in a state of peace. In New York it is proposed to construct an aquaduct for the purpose of bringing the Croton water to the city, at a cost of 3 millions sterling. This work, when completed, will, it is estimated, give a daily supply of 180 gallons a head.

The present water supply of Paris is condemned by the author as inadequate. The

* Principes techniques d'Assainissement des Villes et Habitations suivis en Angleterre, France, États-Unis et presentes sous forme d'Études sur l'Assainissement de Paris, par A. Wazon, Ingenieur-civil. Paris: Baudry, editeur. 1884. 8vo., pp. 364.

use of lead for pipes and linings to cisterns is inhibited, and even when lined with zinc lead pipes are considered by him to be open to objection, and iron pipes lined with some material which will resist the action of salts in water are preferred. Coal tar is recommended by the American engineer, Ripley Nichols, for coating the inside of pipes, but the most perfect results are obtained by the Barff process. As regards filtration, the employment of animal or vegetable charcoal as a filtering medium is now generally discarded on account of its liability to develope animal germs, and spongy iron or carferal are considered to be the only effectual means of filtration. One of the defects of spongy iron as a filtering medium, namely, that it produces filtered water containing particles of iron in suspension or solution is pointed out, but this defect can, it appears, be remedied by passing the water after filtration through a layer of powdered gypsum. Carferal is said to be composed of aluminia, iron, and carbon, and to form a very efficient filtering medium; the composition, however, is a secret, and being also very costly, it is not likely to be generally adopted. It is stated to be largely adopted in the construction of filters for the English navy. The *filtre rapide* of M. Maignen, which is on view at the Health Exhibition, is praised for its simplicity, but upon all points a filter invented by the French engineer Chanoit is preferred by our author.

The pollution of water by water-closets is alluded to, and the necessity of the entire separation of the water required for culinary purposes from that required for flushing is strongly insisted upon, and the various inventions for effecting this separation, and preventing waste, are described and illustrated, the English methods occupying a prominent place. The author is of opinion that the 2-gallon flush, which is required by the Paris regulations, is insufficient, basing his opinion upon the experiments made by Mr. Hellyer, who considers that a minimum flush of 3 gallons is necessary to effectually cleanse the traps. It is strange to find that, while we are grumbling at our system of rating for water supply, the author prefers the English plan of charging for water according to the ratable value of a dwelling, and gives an illustration to show that the price of water is greater in Paris than in London.

Turning to the essay on the removal of refuse, it appears that before the siege of Paris in 1870 household refuse was permitted to be placed upon the side walks from seven in the evening until seven in the morning, and the result was that the atmosphere was tainted with pestilential emanations. Since 1870 household refuse is not allowed to be placed upon the public way, but must be carried to the dust-carts which pass between five o'clock and seven o'clock in the morning. The author considers that the system at present adopted in Paris is inefficient from a sanitary point of view, and recommends that every house should be provided with a dust-shoot fixed on the outside, and delivering into a receptacle, which should be emptied every morning by the *employés* of the municipality.

The use of valves for water-closets of all kinds is strongly condemned. With regard to syphons, all syphons with valves or balls, whether filled with water or mercury, are stigmatised as dangerous, Renk's syphon and Pettenkofer's syphon being denounced by name. Mr. Hellyer is praised for his investigations with reference to what for want of a better name has been called syphonage; but to the American engineer, E. S. Philbrick, the author gives the credit of having been the first to point out the importance of ventilating syphon-traps. The water-closets in use in Paris are declared to be greatly inferior to those in use in England and the United States. The principle of the English pan-closet which, until recently, was preferred on account of its simplicity, and cheapness is examined by our author, and the construction of these closets as well as of the "wash-out" closets (which are much used in America), is pronounced to be unsatisfactory. The hopper closet of Jennings and Rhoad, and the Carmichael closet, the Vortex closet, and the Artisan's closet, all of which are British or American manufacture, are mentioned with approval.

The provision of cesspools to dwellings, which was made obligatory in Paris by a decree of Parliament under date of the 13th of September, 1533, and confirmed by an edict of Francis I., dated 1539, was an immense step in advance, and was destined to put an end to the deplorable condition of the streets, which were encumbered with all kinds of filth. But the improvement was slow, in spite of the severe punishment inflicted upon delinquents. Up to the year 1668 these cesspools were frequently only holes dug in the ground, and the liquid portions of their contents filtered through the adjacent ground and poisoned the wells, as may be observed to the present day in the streets near the Hôtel de Ville, where the well-water has a perceptible odour of sewage which has percolated from old porous cesspools. This state of things continued until the year 1809, when an Imperial decree was promulgated regulating the construction of these important sanitary accessions. Notwithstanding the improvements that have been recently effected in regard to cesspools, the author agrees with Professor Vallin that they should be entirely abolished. In the year 1881 the Commissioners for the Sanitation of Paris proposed as a temporary measure the use of metallic cesspools containing from 60 ft. to 200 ft. cube to be emptied by the pressure of the air. These cesspools would require emptying once a week, and the cost of this work, at the rate of 8 francs per cube mètre, as estimated by the author, would amount to the enormous sum of 200 millions of francs, or eight millions sterling per annum. This amount is irrespective of the cost of providing and fixing the temporary cesspools, which is calculated to amount to nearly fifteen millions sterling, and this for a mere temporary expedient. The total expenditure of the Metropolitan Board of Works for main drainage works up to the end of the year 1883 is under six millions sterling.

The different systems that have been proposed from time to time for disposal of the sewage of Paris are analysed, and illustrations are given of the apparatus to be employed, but the conclusion arrived at is that the water-carriage or English system is upon the whole to be preferred for populous towns, and it is pointed out that in nearly every instance the dissemination of zymotic disease which has occasionally occurred under this system has been traced to defects in matters of detail, which do not affect the integrity of the principle adopted.

The old streets of Paris were unpaved, and it was not until the time of Philip Augustus that the paving of the principal streets was commenced. Before this time the public way was covered with a thick layer of mud, traces of which are sometimes found in carrying out sewer works. Belgrand, the engineer, constructed a map of these layers of mud, which were in places several yards thick, and the old streets are easily distinguished from the modern streets by the depth of their strata. The condition of the streets, even when paved, was not much improved. The gutter was in the middle of the street, and one wheel of the carriages was always kept in this gutter, spattering the roadway with mud and moisture. The interstices of the paving allowed the filth of the streets to pass through, which infiltrated the soil and penetrated under the houses. About the year 1830 the substitution of a convex surface for the pavement of streets led to a great improvement in the condition of the public ways in Paris, which are now watered twice daily, the paving is fairly maintained, and the mud penetrates less readily into the soil.

The first materials employed for paving the streets were cubes of stone, at first of large size, and then gradually reduced; this system was succeeded by that of Macadam, which is now discarded in favour of paving of wood and asphalte. Wood paving has the advantage of being almost noiseless, but it is costly to maintain, porous and unhealthy, especially in dark and narrow streets, where the wood decays rapidly. It is related, on the authority of Douglas Galton, that the wood paving in Regent-street, London, was obliged to be removed on account of the ammoniacal exhalations with which it was impregnated, which tarnished the plate in the jewellers' windows; a statement which was alluded to some time since in our columns and which we have no doubt is correct. After passing in review the different systems of paving at present in use, the author declares himself in favour of cement and asphalte, although he acknowledges that these materials are costly and require frequent repairs.

As regards surface drainage the good effects produced by the drying of the soil is recognised, and the testimony of Dr. Buchanan is cited, who has shown that the mortality from phthisis has diminished in some instances, nearly one-half in some English cities since the execution of drainage works; at Banbury 41 per cent., at Rugby 43 per cent., at Ely 47 per cent., and at Salisbury 49 per cent. The same causes have led to a considerable diminution in the death-rate in the United States, notably in the city of Philadelphia.

Among the improvements, which in the opinion of the author are desirable in the public ways, is the provision of public water-closets, which he considers should be gratuitous, and might be placed under the superintendence of the officers of the public hospitals, a box being placed for voluntary contributions.

Some interesting details are given with regard to the removal of household and street refuse in Paris. The total quantity of this refuse amounts, it appears, to 2,000 cubic mètres, or about 54,000 feet cube daily, and its removal is effected by 600 carts. A rate is levied upon all buildings abutting upon the public way for the expense of cleansing and removing the street refuse, according to the extent of the frontage, the amount of the rate, varying from about 1d. to 7d. per lineal yard. In 1880 this rate produced 104,000*l.*; the cost of cleansing, &c., amounted to 212,000*l.*, leaving a deficiency of 108,000*l.*; which, we presume, is made good out of the metropolitan budget.

The river Seine, the Bièvre, and the rivulet of Ménilmontant, were from the earliest times the natural means of drainage of Paris, and it was towards these three streams that the ancient inhabitants directed the rain-water and household refuse water by means of ditches formed across the garden ground with which the city was surrounded. Later on the moats of the fortifications erected by Philip Augustus and Charles VI. received a portion of the surface drainage. These ditches were open, and as the city increased in size became offensive and injurious to health. About the year 1374 Hugues Aubriot, mayor (*prévôt des marchands*), constructed the first sewer, properly so-called, by covering in the ditch which conveyed the drainage from Montmartre into the brook of Ménilmontant, already polluted from changes near its source. This sewer, which was called the great circular sewer, was reconstructed by Turgot, the then mayor, in 1740. Under the First Empire the improvement of the sewers was looked upon as the necessary corollary of the introduction of the water of the Ourcq into Paris, which was intended by the engineer Girard for the purpose of flushing the sewers, the total length of which, in 1806, was only about 23,000 yards. In consequence of the increase in the volume of water supplied to the city, the Ménilmontant sewer, which was only about 10 ft. wide, was soon found to be insufficient; and when, in the year 1830, the city engineers were desirous of further developing the system of sewerage, they laid the inclination of their new sewers, not towards the Ménilmontant sewers, but towards the Seine. The result of this step was to re-establish the inconveniences which former generations had sought to remedy; and it was not until 1856, when the engineer Belgrand was appointed, that he succeeded in organising a complete system of common sewers and intercepting sewers, which is now partly finished.

By a decree of the Council of State, dated the 22nd of January, 1784, no communication was permitted between dwelling-houses and the public sewers, and an order of the king,

dated the 30th of September, 1814, confirmed this decree, with this exception, that buildings which were too low to deliver their waste water into the kennel, were allowed to deliver it into the sewers. This permission, however, was only of a temporary character, and was limited to certain old houses which could not be rebuilt without stopping up all communication with the sewers.

At the present time every house in Paris is obliged to deliver the rain-water and household waste into the sewers. The municipality thus admits the necessity that every street should be provided with a sewer of sufficient dimensions : a street less than 60 ft. wide must have one sewer, and a street more than 60 ft. wide two sewers, one upon each side of the street. An interesting description of the system of sewerage adopted in Paris is given, and the various methods suggested for cleansing and ventilating sewers are discussed at length, and with signal ability, the systems of ventilation applied to the towns of Eastbourne and Gloucester being selected for approval. The ventilation of the Frankfort sewers is also referred to,—which work was carried out by the English engineers, Messrs. Gordon & Lindley,—and was declared by Sir Robert Rawlinson to be superior to any sewerage works, public or private, in England or elsewhere.

Touching the purification of sewage, the opinion of De Freycinet is quoted, that hitherto all attempts to purify sewage by merely chemical means have been unsuccessful. In Belgium the same conclusion has been arrived at, and in France the partial success of the schemes in operation at Clichy and Gennevilliers do not affect the general principle. The results of the experiments at Rheims are, it would appear, even less favourable than those obtained at Paris. The number of patents for purifying sewage taken out in England between the years 1856 and 1876 was 421. The whole of these processes, which are more or less complex, may act as clarifiers, but they have a very limited effect upon soluble matters.

After passing in review the various processes suggested for purifying sewage, the author concludes that the principle of downward intermittent filtration possesses the marvellous property of completely purifying sewage, but that, as is admitted by the inventor of the system, it is a costly process, and offers no possibility of recoupment.

NOTES.

THE current number of the *Archæologische Zeitung* contains an interesting discussion on the metopes of the east end of the Parthenon. The sculptures still remain *in situ*, but so severely injured by time and weather that their individual explanation has been regarded as a well-nigh hopeless problem. It is, however, generally accepted that the series represented a giganto-machia, and since the discovery of the Pergamene giganto-machia frieze every monument embodying that myth has been studied with redoubled interest. Dr. Robert now brings together all the available material,—the drawings made by Stuart, those published by Labouche and Michaelis, and the descriptions and notices of Leake, Stephani, Cockerell, and others ; to these he adds a consideration of the general typography of the myth on black and red figured vase-paintings, and relying on these data he explains the fourteen metopes as follows :—I. Hermes ; II. Dionysos ; III. Ares ; IV. Hera ; V. Chariot of Zeus, with Nike or Iris ; VI. Zeus ; VII. Chariot of Athene, with Aglauros ; VIII. Athene ; IX. Herakles ; X. Chariot of Herakles, with Iolaus ; XI. Apollo ; XII. Artemis ; XIII. Poseidon ; XIV. Chariot of Poseidon, with Aphrodite. This arrangement has the advantage that it places in a central, conspicuous position Zeus, Athene, and Herakles, always in the giganto-machia the three most distinguished combatants, while the remaining gods and goddesses fall into natural pairs on either side. The arrangement is ingenious, and shows how much can be done with scanty material. But, surely mutilated though they are, these metopes deserve to be carefully cast before time and weather entirely complete their ravages.

THE Prussian Imperial Archæological Institute has in hand no less than five serial publications which are of the highest importance to archæologists and artists. 1. A continuation of the great work of E. Gerhard on Etruscan mirrors. Since Gerhard's day much new material has been added and some new light thrown on these somewhat mysterious Greco-Etruscan designs. The first issue of this continuation has appeared. It is edited by Klügmann and Körte. 2. A collection of antique terra-cottas, intended, so far as possible, to be a complete series. The second volume of this publication will shortly appear. The whole is under the management of Otto and Kekulé. 3. The collection of Roman sarcophagi, arranged by Robert, of which a few specimen-plates are prepared and will be shortly published. 4. A continuation of the series of Etruscan ash chests by Körte. 5. A continuation of the collection of Greek grave reliefs, the Attic part of which is just about to be published by the Academy at Vienna. It will be seen that all these publications have one common aim, *i.e.* to bring together material. This material is at present scattered far and wide, often only accessible to a few, and that by an almost impossible expenditure of time and money. When these five publications are completed we may hope for a flood of light on difficult questions connected both with mythography and the chronology of art. Only by juxtaposition can come comparison ; only by the comparative method comes secure elucidation.

THE absorption of the two small gas companies, called the Woolwich Consumers' and the Woolwich Equitable, by the South Metropolitan Company, is a step that appears to be in the interest of all concerned, and primarily in that of the public. The total capital raised by the two small companies (according to Mr. Field's Analysis) consists of 67,814*l.* for the first, and 22,500*l.* for the second : items that form but a small proportion of the South Metropolitan raised capital of 2,211,510*l.* The character of the gas manufacture, and especially the mode in which, owing to its extreme lightness, the manufactured product is conveyed from the works, are such as to render concentration of work a source of greater economy in gas, than in perhaps any other industry. Thus the working expenses of the two small companies for last year came respectively to 15·70d. and 19·95d. per 1,000 cubic feet of gas sold, while those of the South Metropolitan Company were 13·83d. Thus the reduction of 2d. per 1,000 in the price of gas may at once be secured to the customers, to say nothing of the advantage of the further extension of the sliding scale. The account given of the terms of amalgamation, indeed, speaks of a reduction from 3s. to 2s. 8d. per 1,000, as well as of a rise in illuminating power ; but the charge of the South Metropolitan for 1883 was at the rate of 2s. 10d. per 1,000. For the net cost of coal and all expenses, last year, the small companies paid 21·63d. and 23·47d. respectively, and the South Metropolitan 18·20d. per 1,000 cubic feet sold. It is only by grasping facts of this nature that the question whether concentration is advantageous, or the reverse, can be really decided.

THE Turks, we have been recently told, concern themselves with the present only, the future is in the hands of Allah, the past is unprofitable. With such a creed it is much if they do not destroy any such relics of this unprofitable past as they possess. It is much more that they have allowed an unbeliever to classify and catalogue the antiquities now exhibited in the Tchiuli-Kiosk. This work was undertaken by M. Salomon Reinach, a member of the French School at Athens. It gives a somewhat hasty but most valuable description of the treasures of this museum. He found the monuments heaped together in the utmost disorder, and with unhappily no clue to their identity excepting occasional loose labels. The catalogue was completed in 1882. It is now being followed up by publications from photographs of certain selected monuments of particular interest. Three appeared in the May-June issue of the French "Bulletin" with explanatory text by M. Henzey. 1. A very remarkable archaic head which M. Henzey attributes to Rhodes, and to which he devotes a searching analysis. 2. A beautiful stele from Macedonia, representing the nude figure of a young warrior with helmet, spear, and shield,—a work probably of the early part of the fourth or latter half of the fifth century B.C. 3. A large bronze Hercules, standing with the club over the right shoulder, the lion's skin over the left arm, and some uncertain object in the left hand. This bronze is remarkable for its size and the novelty of its motive, but is somewhat dry in execution.

SIR CHARLES DILKE is reported to have said in the House of Commons last week (the 4th) that property was assessed much higher in London than in other towns. What is the fact? Taking the only towns with which any comparison can be instituted, viz., those of upwards of 200,000 inhabitants each (the whole of which, taken together, make up only about half the population of London) we have the following comparison. In London the ratable value is 82·5 per cent. of the gross rental ; in Liverpool it is 90 per cent. ; in Manchester and Salford, 84·7 per cent. ; in Leeds, 83·4 per cent. ; in Birmingham, 83·6 per cent. ; in Bradford, 83·7 per cent. ; and in Sheffield (alone lower or so low as in London) 75·9 per cent. For all England the ratable value is 82 per cent. of the gross rental. These facts are as important to the Londoners with regard to their present proportional rating, as they are with reference to the health of the metropolis. It should be considered indispensable to ascertain the actual facts of a case before setting to work (in the absence of such knowledge) to improve it.

THE first meeting of the Société des Amis des Monuments Parisiens, after that which was held for the purpose of organisation, took place on the 29th of June, and was occupied by the reading of a paper by M. Maurice du Seigneur, relating to some sculptured stones, work of the last century, to which M. Ch. Lucas had drawn attention, and which must have formed part either of one of the three former *frontons* of the Panthéon (before those by David d'Angers), or of the bas-reliefs formerly decorating the façade of that building. The Society has commissioned MM. du Seigneur and Lucas to pursue their researches on the history of this sculpture of a century old, and we shall probably be able to state the further results of their investigations in due course.

THE competition organised in connexion with the national manufacture of Sèvres, in which first and second prizes are awarded to French designers only, will have for its subject this year, "Une cheminée de boudoir et la garniture pouvant faire corps avec la cheminée." The work which receives the 5,000 fr. prize will remain the property of the State, and will be executed at Sèvres at Government expense. Why will not some other Governments take example?

ON Wednesday evening the Executive Council of the International Health Exhibition, represented by His Grace the Duke of Buckingham and Chandos, K.G., and the Council of the Society of Arts, represented by Sir Frederick Abel, C.B., F.R.S., &c., received at the "Healtheries" a vast concourse of visitors, and provided for their entertainment every imaginable form of delight. The grounds never looked so much like fairy-land, and were the subject of unstinted and universal admiration. "Old London" under the combined influence of a bright moon and the electric light was charming. The shops were kept open, and smiths and braziers in their quaint costume worked away and explained with never-failing suavity and patience the mysteries of their several crafts, while the

hand-bell ringers from a balcony discoursed the kind of music most familiar to the scene represented. In only one point the resemblance to the original failed, for Old London never witnessed such a crowd of gaily-dressed and handsome women as on that night thronged its streets from dusk till midnight. Perhaps the chief of the attractions was the Chinese department, opened for the first time on Wednesday evening. The Chinese have had the entire control of the building and decoration of their court, and wonderfully light and pretty they have made it. Benign Celestials dispense "real Bohea," and smile serenely when questioned in a language they unfortunately "do not understand." We admire a great deal that belongs to the Celestial Empire, but we cannot admire their music. The band performed at intervals, and the programme comprised some remarkable solos. As to the singing, it was the nearest conceivable approach to caterwauling. There is reason to believe that the themes were serious, and that "The Seal of Longevity" and "The Ladder of Happiness" were not comic songs, notwithstanding the loud and immoderate laughter with which they were received. The calm philosophic Celestials smoked their long pipes in the intervals of their programme, and no doubt set down our misappreciation of their efforts to the general benightedness of our condition. As we pass out the strains of the Coldstream Guards band swell upon our ear, and it will take a good deal to persuade us that Chinese music is the real thing.

THE verdict of the jury on the fatal accident on the New Angarrack Viaduct (Great Western Railway) can hardly be accepted as satisfactory. Two men were lowering a stone of 22 cwt. with a crane when the "spill," a piece of iron by which the weight was suspended at the top of the "jacket," broke, and one of the men was killed by the consequent fall. The piece which broke was wrought iron, and was supposed to be safe at a load of 30 cwt., and the evidence went to show that nothing unusual occurred in lowering the stone. The verdict merely recorded the facts, without expressing an opinion. Unquestionably either the limit of safety was too low, or the iron was defective. It is an accident that ought not to have happened.

THE important case of Vassie *v.* Baker, an action by a tenant against his landlord for bad drains, which was partially heard and adjourned some weeks ago, ended in a *fiasco* on the resumption of the case on the 4th ult., the jury being unable to agree, in the face of very conflicting evidence. The case turned on whether the pipes had originally been badly laid or not, about which it is hard to come to any conclusion on the evidence. Lord Coleridge, in his summing up, laid it down that, the plaintiff having taken the house after an assurance that the drains were in proper order, the landlord was undoubtedly liable if the contrary were proved to be the case.

THE unsanitary condition of the House of Commons, we are sorry to see, occupied the attention of Mr. Lowther and the Speaker on Wednesday evening. It appears that the effluvia from a sewer which runs outside the gates of the Westminster Palace, at the corner of Parliament-street, makes itself felt in the House, under certain atmospheric conditions. If the sewer is the real originating cause of the odour, we do not see what the ventilating arrangements of the House itself have to do with it, as the Speaker seemed to imply. It is the sewer that wants ventilating, not the House of Commons,—at least in regard to this special evil.

AS we stated a long time ago, the project for concentrating the Thames Valley sewerage at Mortlake would, if the sewerage were properly treated according to the best mechanical and chemical processes, have probably resulted in the discharge into the river only of an effluent which would have been practically innocuous and imperceptible, and we were noting the other day with satisfaction that our previous opinion was supported by the evidence of Dr. Frankland, Professor Dewar, Mr. Crookes, and other scientific men whose opinion on such a subject is of special value. Suddenly, on Wednesday of this week, came the news that the Special Committee had quashed the scheme. The particular reasons for this unexpected result are at present only on hearsay; they are said to be commercial rather than sanitary. At all events, there seemed a near prospect of something being done, and now all is at sixes and sevens again. Fifty rowing clubs, it appears, gave evidence of their dread of the effluent. But what was the value of their combined scientific experience? or which do they prefer in a river, a "treated" effluent or raw sewage? There is plenty of the latter in the Thames at present, at all events.

BY the way, the question not only of what we run into the Thames, but of what we take out of it, is likely to become of increasing practical interest. People seem at last to be getting made painfully aware of the fact that you cannot go on pumping so many millions of gallons per diem out of a river of moderate size without producing visible and unmistakable effect on the contents and condition of the stream. So much water is abstracted from the Thames now that in dry weather there is not enough coming over Teddington weir to cover the bed of the river. One consequence of this is that there is less stream to carry away the impurities which now find their way in, and the Thames above Richmond is unquestionably more muddy and offensive at low tide this year than it has ever been before. As you can't both have your cake and eat it, so you can't both have your river and drink it.

THE Select Committee on the Thames Communication question have delivered their report. As was to be expected, they have negatived the utterly unpractical idea of the Duplex Bridge, but report that two crossings are immediately necessary,—a low-level bridge at Little Tower Hill, with two openings, each about 100 ft. wide, spanned by a pivot swing-bridge; the other a subway at or near Shadwell, which they consider would best meet the wishes of the inhabitants in the more eastern part of London. We believe the latter will be a useful work, inevitable sooner or later. Concerning the swing-bridge we feel much more doubt. Two vessels arriving from opposite directions can pass at the same time, but then vessels will not always be so obliging as to come at the same time, and then the bridge must be kept open to wait for the later one. The time of detention for vehicles crossing will thus be considerably lengthened; and, as we have said before, a bridge which may at any moment be open, and which is sure to be open just when you are in a hurry, is hardly worth calling a bridge, for the practical purposes of a large traffic.

CAMPS, CASTLES, FORTIFICATIONS, AND EARTHWORKS OF WARWICKSHIRE.*

BRINKLOW EARTHWORKS.

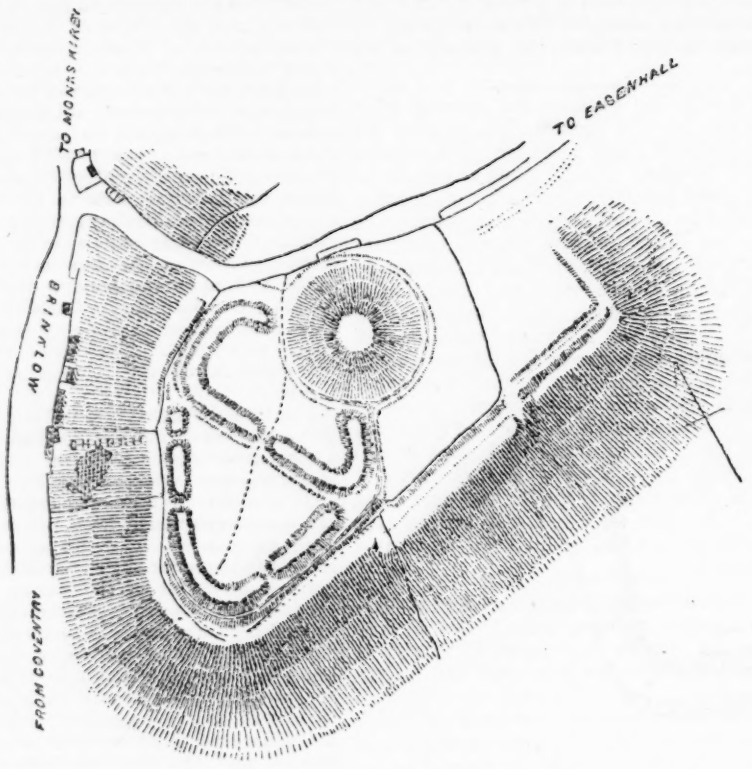
THE village of Brinklow is situate on the Roman Foss-way eighteen English miles from Leicester, the Ratis of Antonius, and six miles south of Claybrook, or Venonis, the Roman centre of Britain, where the great Roman British military roads the Foss and Watling-street crossed each other. Its mound or tumulus is a most conspicuous object for miles round, and the camp in which it is situated is upon the terminating point of a ridge of elevated land stretching thence in a north-easterly direction. Dugdale, in his "Antiquities of Warwickshire," says, "This place has its name from that eminent tumulus whereon the keep or watch-tower of the castle, which long ago was there, did stand, but whether it was because this little hill, by our ancestors termed a low, stood upon the edge or brink of the natural ascent overtopping the rest of the country thereabouts, or from the British word 'brynn,' which is the same with *collis* in Latin, 'tis hard to say. Leaving my reader, therefore, to his own fancy, I shall first consider the ruins of that quondam castle, concluding that had it been a work since the Norman Conquest our public records or some other authorities would have taken notice thereof. But that it was more ancient the diversion of that noble Roman way, viz. (the Fosse), for the raising such a fort does no less argue than the extent of that pool which, from the said road, covered the adjacent valley even unto the skirts of Newbold Revel. How be it, in Domesday Book there is no mention of it, for as much as it was then involved with Smite, and so consequently part of the possessions which Earl Alberic had." When the Roman General Ostorius, in the year 50, invaded Mid-England, the forest of Arden covered the greater portion of Warwickshire; he met some slight opposition from the natives, who, however, were unable to repel the invasion of their territories, and therefore submitted to the conqueror. They appear to have had a perfect chain of fortresses upon the hills hereabouts,—at Burrow-hill, near Daventry, Edgehill, Brinklow, Breedon-hill, Corley, Brownsover, Oldbury, and elsewhere,—to which they could retreat and offer defence when their lands were invaded. These fortresses were on the frontiers of the British tribes and upon the borders of the countries of the "Dobuni" and "Carnabii," and from them communication was no doubt given of an enemy's approach, by means of watch-fires, to the dwellers of the neighbouring hills and forests.

The Romans probably found this spot fortified on pushing their military road southward from Venonis, for slight traces of old rude earthworks existed amongst the small inclosures and gardens towards the village. Having carried the position by force, and thinking it too good to give up, it would appear they constructed a camp for their own occupation to the north-east of that of the native tribe. As a rule the Roman engineers chose level low-lying ground for their camps, where supplies of wood for fuel, and water for horses were plentiful; but policy often dictated otherwise, for, desiring not entirely to extirpate their opponents or their defences, they gradually caused camps of the square form to be built adjacent to the British ones, and thus the inhabitants, mixing with themselves, acquired Roman ways and manners, became useful members of the State, or attended the imperial armies to other lands and conquests as soldiers or servants under the ensigns of the empire. The remains of the Roman or parallel line camp consist of a double row of ramparts and ditches facing the south-east and cresting the summit of the hill on that side; they are not straight, however, but had a entrance nearly at their centre, and probably some outer defensive work existed at this spot. At the foot of the hill there is a corresponding drip or cutting from the fosse to the land, which seems evidence that a road to the camp existed on this side; the rampart is returned at the angle, and shortly dies into the natural slope. A ridged track is perceptible on this side, and is said to have formed a road to the camp. The rest of the earthworks of this earlier camp are not now discernible; probably a stockade or wooden fence existed on its ramparts. It would see an engagement during the turbulent hundred years 450 to 550, when Britain, no longer held by Roman arms, was invaded by bands of Saxons, Jutes, and Angles, who overran the country and destroyed much of the Roman defences in the Midlands.

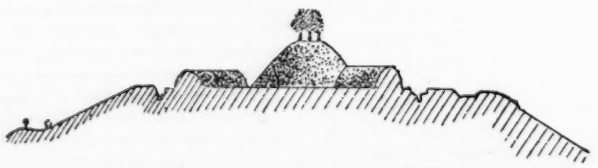
In process of time the Saxon, finding the remains insufficient for defence against the Danes (during the period 840—1040), and near the boundaries given to that people to settle in, built the camp anew, or rather erected his castle upon what was left. The works being unwieldy, he divided them into baileys or courts, raising more extensive ramparts and defensive ditches from the ridges of the hill sides, and terminating in the Roman inclosure at the north-east, in which he placed his mound or castle keep, surmounted with round wooden or rude rubble stone dwelling (similar to the representation shown in the Bayeux tapestry and contemporary illuminated MSS.), for the use of himself and family, and around which a constant guard was kept against invasion and the sudden approach of a stealthy foe; whilst his soldiers and immediate attendants occupied the baileys in time of peace, living in rude wooden thatched dwellings; and the whole population of the district assembled therein in times of war

* The illustrations are all to a scale of 6 chains to an inch.

for mutual defence. At other times, the Anglo-Saxon, disliking to live in fenced inclosures, enjoyed the open and free land in the settlements around. A narrow causeway would connect the keep and baileys, shielded by walls, upon which persons could only go in single file; it is possible that this conical-shaped hill (whether Roman or Saxon is not clear, as its remains are still undisturbed) was a tumulus or used for sepulchral purposes. There are several Saxon camps of similar construction, of which that at Laughton-en-le-Morthern, held by Edwin, Earl of Mercia, son of Leofric and Godiva, and brother of King Harold, illustrated in the *Builder* of July 11th, 1874, is one. This shows the conical-shaped hill and inner Saxon bailey, as at Brinklow, with its ramparts and



Brinklow Camp and Earthworks.



Section of Brinklow Camp, from North-West to South-East.

Section of Brinklow Camp, from South-West to North-East.

ditches running in a rude horse-shoe form and terminating near the mound. It would be instructive to compare similar structures, and thus by their remaining features the castles of the greater thanes during this period of the Saxon occupation could be defined. The ramparts of the Saxon camp remain undisturbed,—that at the angle furthest from the tumulus is 25 ft. by 30 ft. from the bottom of the ditch to the top of the rampart; it rises 15 ft. above the ground level of the camp; and the ramparts generally are from 50 ft. to 70 ft. above the village street, and 150 ft. above the surrounding meadows. The outer ramparts of the inner bailey are stronger than that between the inclosures, and a ditch is carried between these latter, but is not so deep as that surrounding the outer defences of the camp itself. Other earthworks, slighter in form, exist on the hill side towards the village; the mound or tumulus is about 50 ft. high, and 300 ft. in diameter (ditch included) at its base. The top is 390 ft. above sea level, and from it a most extensive view can be obtained on all sides; but it is evidently somewhat reduced from its original height.

It would appear that in Norman times Brinklow was in the manor of Smite, the Smitha of Domesday Book, for in the register of Kenilworth it is stated that Sampson de Albineio, an incumbent of the church of Smite, in the time of Henry I., did by the consent of Roger de Mowbray, his patron, grant to the prior of Kenilworth his church at Smitha, with his chapel at Brinchelau attached thereto. In the time of King Edward the Confessor, Smitha was held by a Saxon freeman named Harding, but as most of the manors hereabouts were in the keeping of Alwin, the sheriff, or Lewin (his brother, as he is stated to have been under Flecknoe in the Domesday, and who is certified to be free, and "able to go wither he would"), the castle was probably, as stated by Dugdale, in the possession of Alwin or his family. Alwin was father of Turchill, Earl of Warwick. At the Conquest the castle was probably one of those possessions which the Conqueror took from the earl. Shortly afterwards, however, it was unjustly seized by Earl Alberic, who appears as a lawless freebooter, acting in his own interests, and making short work with his Saxon neighbours' possessions in Warwickshire and elsewhere, insomuch that the Conqueror issued writs against his aggrandisements, and placed the sequestered manors of Bramcote, Smite, Radway, Nuneaton, Clifton, and Waura, under the safe-keeping of his follower, Jeffrey de Wirce. Nothing is, however, said of this castle in Domesday, but shortly after the Crown gave the manor to the Earl of Mellent and Leicester; by him it was granted to Nigil de Albany, father of Roger de Mowbray, by the service of one knight's fee, and was so continued to the time of Henry II., when Sampson de Cornubia held the castle in military service under the Mowbrays, although by an agreement and exchange of lands those here passed to the family of Stuteville. The church is an old one, dating from Norman times; the tower, nave, and aisles appear to have been rebuilt in the time of Henry VII., but the chancel is of a later period; the village also sprang up in Norman times, and Nicholas de Stuteville obtained for it a weekly market from King John.

From the Mowbrays the castle came to the Segraves, with whom the military service appears to have ceased. In the 9th of Edward II. Aldred de Wyttlebury is certified as lord of the manor, and by divers owners it came, in the 22nd of James I., to Arthur Gregory, of Stivichall, near Coventry, and in the hands of that family it now remains.

It is said that Cromwell, with the Parliamentary army, occupied the castle for a day or two during the civil wars, but, although probable, there is no proof of the fact, except that several cannon-balls have been found, and that it is called Cromwell's Mount by the inhabitants.

CHESTERTON CAMP.

This camp appears by its construction to have been formed during the earliest period of the Roman occupation in the Midlands. The Fossway passes through it, entering the north-eastern vallum nearly midway in its length, whilst it leaves the camp close to its west angle. The present roadway is 7 ft. 6 in. wide, being now a simple track repaired with local limestone; the camp within the ramparts at the north east is about 10 chains in length, whilst the south-west is little over 7; the south-east and north-west are 7 and 6 chains respectively; the area of the camp field is 30 a. 2 r. 8 p., whilst the camp and its ditches occupies 14 acres. The surface of the ground in the camp sloped some 7 ft. or 8 ft. from the south-west to north-east, and is the natural formation excepting at the west and east angles, where it was made up by the earth removed from the ditches. There are now no signs of a raised rampart around the camp, which has been removed by time and the plough; the ditches were about 25 ft. wide at the bottom, 80 ft. wide at the top, and about 25 ft. high from the bottom of the ditch to the level of natural formation. It will be observed that although the camp is of the usual four-sided arrangement, it is much shorter on the south-west side than on the north-east; this appears to be accounted for by the Roman engineer taking advantage of the natural formation of the land, with perhaps, only a few men at command, and so not able to construct the ordinary square form.

A small stream, having its source in Chesterton and Kingston close by, which can be seen from the camp, runs in a northerly direction along the south-west and north-west sides of the camp, where it crosses the Fosse, and this would supply the camp with water. There are, towards the south-west, traces of a sluice and ditch, with some modern brickwork. The ditches were constructed dry, and could not be flooded, as they are above the level of the brook.

The remains of the camp are much worn by time, especially at the southern and western angles. It appears to be hastily constructed, and to have had no alteration afterwards. Roman coins and pottery have been found here, but not of any special value.

The situation is well chosen, and is sheltered with high hills to the north-east and south-east, whilst there are smaller ones on the other sides. Such a quiet and retired spot would be of much value to the general as a halting-place to rest his men after a weary and lengthened march, the hills around being utilised as outposts to prevent the sudden attack of an enemy. High-down-hill, about a mile and a half away, would form one of these outposts on the north-west, and any signal therefrom could be distinctly seen by those in camp; and a station would be placed on the high ground near the Royal Oak-house to guard the entrance to the camp. An outpost would also be placed on the Windmill-hill adjoining, which could communicate with an outpost-station at Lodge Coppice on the next hill, about a mile from the camp, at which place we have the remains of a square fortification which is probably of the period of the Civil Wars of Charles I., and the Parliament. It is six chains in length, standing on the summit of the hill, from which most extensive views can be obtained of the Foss to the south-west, and towards Warwick, which, with some doubt, has been said to be a Roman station, on the north-west; but Chesterton camp itself cannot be

seen from here, as the Windmill-hill, lies between them. This formation occupies 2½ acres, the greater portion of which is probably as left by its constructors, but in parts it is now much broken by the getting of sand and gravel; it is surrounded by a raised rampart some 20 ft. wide, and 3 ft. or 4 ft. high above the ground; the earth was dug out from the ditch and counter-ditch to form this rampart. There is now a plantation of oaks here, but the earthworks are earlier, as some of the trees are inside them, and some out. There are indications of entrances or breaks in the rampart to the north-east and south-west. This outpost formed a capitally-selected spot from which it was easy to guard against surprises, and consisted of one of a series of entrenched camps on the ridge of hills on that side the Foss, such as those of which we have similar indications at Harbury and Upton. Highdown Hill, as stated above, was another outpost which, from its peculiar formation and commanding view, was probably one of the stations from which the camp could be clearly discerned.

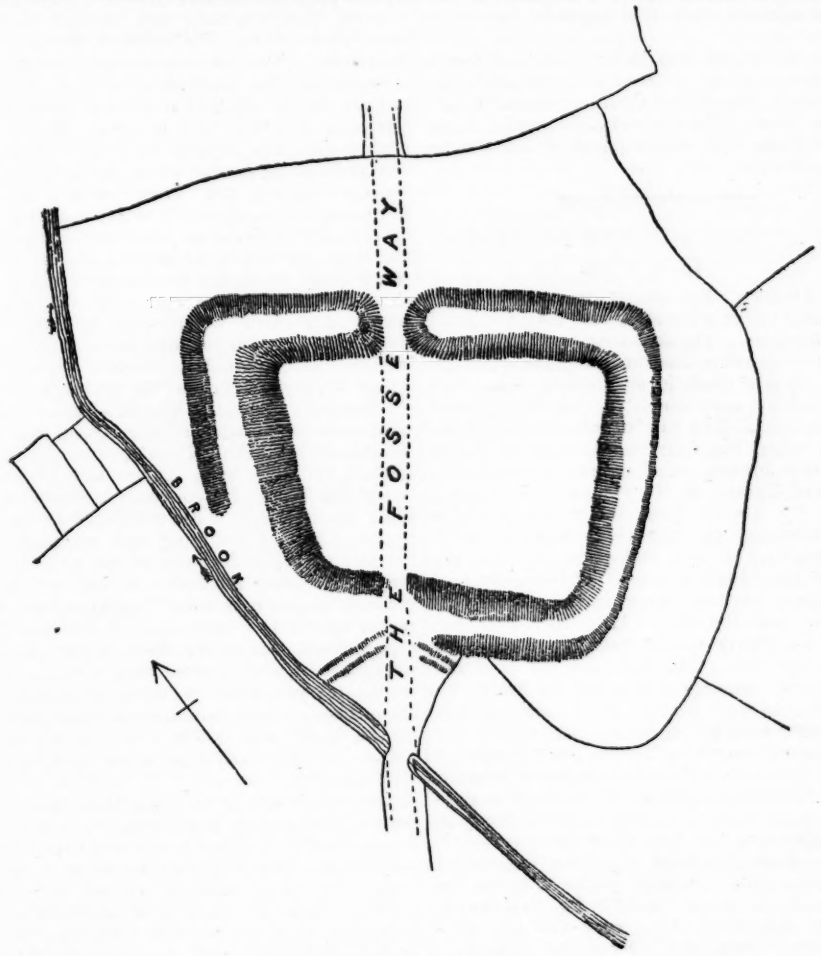
A section of the Fossway near the Royal Oak buildings at Chesterton shows the road and ditches to be 30 ft. wide, the road itself being 10 ft., and raised 3 ft. above the level of the ground, whilst the ditch has an equal depth, and thus the crown of the road would be 4 ft. above the bottom of the foss or ditch.

Jago, in his poem of Edge Hill, thus describes this place:—

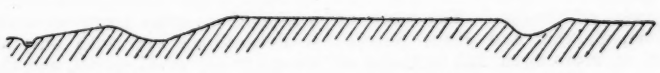
> "Next the wide Champain, the cheerful downs
> Claim notice; chiefly thine, O Chesterton!
> Pre-eminent, nor 'scape the roving eye,
> Thy solemn wood, and Roman vestiges,
> Encampment green, or military road,
> Amusive to the grave historic mind."

It would appear that the camp was a military position at the time of the Conquest, when Chesterton was held by the Abbot of Abingdon of Turchil, Earl of Warwick, who had five English soldiers (*V. milit. Angli*) there, having the keeping of the camp entrusted to their charge. There are five entries of the manor in the Norman survey, and land was held by the Abbey of Abingdon, Turchil of Warwick, Henry de Feriers, and Richard the Huntsman, and the manor is there spelt Cestreton and Cestedon.*

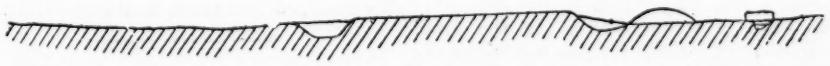
W.



Chesterton Camp.



Section of Chesterton Camp, from North-West to South-East.



Section of Chesterton Camp, from North-East to South-West, through the Fossway.

EXCAVATIONS AT ELEUSIS.

M. BLAVETTE, of the French Academy at Rome, has recently published a summary of the results of the work that has been carried on during the past year at the modern village of Lefsina, a village that stands within the very precincts of the ancient enclosure sacred to Demeter, at Eleusis. With the exception of a few houses and two churches, dedicated Lefsina has now, in the interests of antiquity, been completely demolished, and a vast substructure laid bare. As might be expected, ancient literary testimony as to the construction of the Eleusinian sanctuaries is very meagre. Pausanias, our constant archæological cicerone, was initiated into the mysteries, and must have been thoroughly cognizant of all the architectural details of the buildings; indeed, so great was his desire to make his note-book complete, that he seems to have at one time contemplated divulging these details, but he was warned, he tells us, in a dream, of the terrible judgments that awaited such impiety, and he dared not utter a word of the ceremonies he witnessed, no, nor even of the plan of the building in which they were displayed. Strabo, our second authority, was apparently never initiated, in which case he can have seen the sanctuary from the outside only, yet his account is the most circumstantial we possess, and it is this account that is remarkably verified by the recent excavations.

Strabo says: "Next (*i.e.*, after the country of Megara) comes the town of Eleusis, in which is the temple of the Eleusinian Demeter, and that sekos or sanctuary for the mysteries, built of a size to contain as many people as a theatre, whose architect was that same Ictinus who built the temple of the Parthenon in honour of Athene, during the time when Perikles superintended public works at Athens."

This passage has been too much disregarded until the excavations of the Archæological Society showed its full importance, and confirmed its accuracy. Two distinct buildings are mentioned by Strabo, and two distinct structures have been in part laid bare by the excavators;—the Temple of Demeter, strictly so-called, and the building that Strabo calls the sekos, a great hall for the reception of the candidates for initiation. Both buildings are contained in one common enclosure, but they are entirely distinct. The sekos is, in fact, no temple at all; it has,—or at least originally had,—neither portico nor vestibule, nor opisthodomos; it consisted of one vast hall, with no sort of internal division, round the walls of which ran eight tiers of benches, raised tier above tier to accommodate the spectators. To this single hall there was added later by Philon, in the archonship of Demetrius of Phalareus (309, B.C.), a portico or prostylon of twelve columns. Vitruvius distinctly records that this prostylon was the work of Philo, and no part of the original structure, with which indeed it accords but ill. The Dilettanti Society, conducting excavations on this site many years ago, and under great difficulties, misunderstood this prostylon, and attributed it to the original building. As such it appears in their restored plan. The more systematic investigations of the recent explorers have justified the statement of Vitruvius that the prostylon was a later addition. It is about this sekos of the time of Perikles that the chief interest of the excavations centres; with the impulse given to art and social life by the Persian war, there came a great revival of the old Demeter worship at Eleusis. Her festivals increased in splendour, and to meet the needs of larger throngs of the initiated this vast sekos was built. On the connexion between this revived Demeter worship, and certain politico-economical measures of Perikles, with respect to corn lands, great light has been thrown by an abundant harvest of inscriptions. Long before the Persian war, however, Eleusis was the centre of ancestral cults; the battle of Salamis was fought in sight of the shores of Eleusis, and it seemed to the Greek warriors as they waited for the fight, that they heard the trampling of feet, and saw the flashes of mystic torches along the Thriasian plain. Some traces of the building sacred to this pre-Periklean worship have been discovered during the excavations,—heavy polygonal walls, and a vast structure of unbaked bricks are undoubtedly Periklean, also an archaic ram's head in terra-cotta.

To fix exactly the site of the temple proper, as opposed to the sekos, will require further excavations. Meanwhile M. Blavette is at work at a plan of the sekos, including all his conjectural restorations.

* To be continued.

Bristol Master Builders' Association Annual Outing.—Wells and Glastonbury were the places selected this year for the annual outing of the members of the Bristol Master Builders' Association, which took place on Tuesday last. The party, considerably over fifty, left Bristol by train at 9.30 a.m., and arrived at Wells shortly before ten o'clock. Lunch was served at the Swan Hotel, and afterwards a visit was paid to the cathedral. The company then drove off in breaks to Glastonbury, and here the grand ruins of the abbey proved the chief attraction, the holy well and abbots' kitchen being inspected with much curiosity. The well-known Tor was reached by many of the party, from the summit of which a magnificent view of the country is to be obtained. At half-past four the company sat down to dinner at the George Hotel, Glastonbury, under the chairmanship of the President of the Association (Mr. August Krauss), the vice-chair being occupied by the Deputy chairman of the Association (Mr. G. Humphreys). There were also present Mr. W. H. Phillips (secretary), and Mr. J. Thorne (treasurer).

DECLINE IN THE TRAFFIC OF THE SUEZ CANAL, AND FRENCH AND ENGLISH VIEWS OF THE CAUSE AND THE REMEDY.

So far as the proceedings of the Directors of the Suez Canal, at their meeting on the 1st current, have been permitted, or rather arranged, to transpire, the first half of 1884 has witnessed a marked decline in the traffic. That such was the case may have been the suspicion of many persons who have noticed the accounts of daily transport published in the morning journals, although but few will probably have taken the trouble to carry the items to account day by day. The MM. de Lesseps are said to regard the check as only temporary. From the opening of the Canal in 1869 the increase in the number of ships that passed was steady until 1875, and then fluctuated for four years, the number for 1879 being seventeen fewer than that for 1876. The tonnage and the traffic receipts, however, rose till 1877, but were less in 1879 than in 1877 by upwards of 120,000*l*. From 1879 the rise in all these items was rapid and continuous till the close of 1883, when the receipts were rather more than seven times the amount received in 1871, although the expenditure of 1882 was less than that of 1870 by more than 20,000*l*.

A check in the traffic, therefore, would not give much cause for alarm but for its connexion with facts that hardly lie within the purview of the French directors of the Canal. In the year 1881, for the first time since the publication of the statistical returns of our shipping, the shipping tonnage of the United Kingdom declined in amount. The present state of that important trade is very serious. The imports and exports of the United Kingdom were 4 per cent. less for the half-year, and 20 per cent. less for the month of June, in 1884, than in 1883. The last report of the Tyne Commissioners states that the number of steamers now laid up in the river is 104, with a total tonnage of 90,000 tons. At Jarrow, at Witton Park, and at Middlesbrough, "the streets are full of unemployed men." For a vessel classed A 1, well engined, and guaranteed fast, valued at 20,000*l*. no higher bid was obtained on the 23rd ultimo than 12,000*l*. Whether it be the case, as the shipping interest appears to consider, that this panic is due to the introduction of the Government Shipping Bill, in part or in whole, or not, of the paralysis there can be no doubt.

Under these circumstances it is not matter for wonder if the French directors of the Suez Canal are desirous to postpone the reduction of 50 centimes per ton, which was arranged to commence this month, and which would amount for the six months to something like 70,000*l*. The seven new English directors have not yet been able to take their seats, the requsite change in the statutes of the Company not having yet been authorised by the Egyptian Government. But it is not a question of a tax of this amount (some 75 per cent. of which would be borne by English bottoms) on our Indian trade which most claims the attention of the country. To ascertain the real cause of the check in one of our most important industries is a matter of far more moment than is an addition of 4½d. per ton to the freight of a long voyage; and if it be true that the shipowners and shipbuilders of Germany are not struck by any similar check, but are, on the contrary, thriving on our discountenance, it would seem as if the reply to the question, "What is the cause of the shipping decline in England?" ought to be as ready, and as distinct, as it is virtually important to the country.

The question of the mode in which the necessary increase of accommodation for the ocean traffic through the Isthmus should be provided appears to have been set at rest by the three nights' debate on the subject of "Speed on Canals," on the 5th, 12th, and 19th of February, 1884, which is reported in the seventy-sixth volume (just issued) of the Proceedings of the Institution of Civil Engineers. Out of thirty speakers who took part in that debate,—including civil engineers, shipbuilders, and naval men,—but one was found to advocate the scheme of a second canal, and his remarks only brought into fuller relief the advantages to be derived from widening the existing channel, rather than attempting to cut a new one. When it is borne in mind that each vessel that passes through the Canal pays a total of nearly 800*l*. (in 1883, 3,307 ships paid on an average 796*l*. each); while the total expenses of maintenance, transit, and administration only amounted to 74*l*. per ship, it is tolerably clear that the customers of the Canal have the right to expect that those measures which, as pointed out in the debate in question, would reduce the time needed for the passage of a vessel from the actual allowance of 53 hours 41 minutes, to a maximum delay of 12 hours, should be taken without further procrastination. According to the reports taken from the French papers, the hope is entertained in Paris that the new English directors will themselves propose to defer the reduction of 50 centimes per ton that should come into operation during the present month. It is much more rationally to be expected that the influence of these gentlemen will be thrown into the scale with the view of making an enterprise that earns that enormous proportional profit really available for the requirements of navigation, which, at the present moment, cannot properly be said to be the case.

Since the above was in type we have ascertained from official sources that the decline in the receipts of the Canal Company from navigation has been 14·7 per cent. in May, and 21·1 per cent. in June, 1884, as compared with the same months in 1883.

SALE OF PRINTS IN THE FOUNTAINE COLLECTION.

SIR ANDREW FOUNTAINE was born in a fortunate day for collectors, and he made good use of his time. The fact that he should have been able to gather treasures together enough to take Messrs. Christie & Manson eight days in the selling, says much for his energy and discrimination. The aimless crowds who came flocking when the faïence was sold, to exstaticise over clumsy candlesticks, and kitchen utensils of Urbino, or Nevers, or Palissy ware, are happily absent from the rooms when a great collection of engravings is to be sold. The strength of the collection lay in the works of the "little masters" of Germany, and of the great master, Dürer; in the etchings of Vandyke, and the Marc Antonios; and the interest was fairly spread over the whole four days of the sale. The splendid set of Aldegraver's work was the feature of the first. No reason, by the way, is given by Bartsch, or any other writer with whom we are acquainted, for distinguishing, as Bartsch does, the "Master of the Monogram, A.G.," from Aldegraver himself, or some fraudulent copyist of him. The date of Aldegraver's death is placed speculatively at 1558. May not the fact that this "master" (or fraudulent possessor of) "the monogram A.G." puts 1562 to many plates, suggest for his demise a later date? Be this as it may, the collection was a very fine one, containing the "Parable of Dives and Lazarus" (in five prints), and the set of the "Wedding Dancers," 1538,and other things which Duplessis holds up to especial admiration. The work of the two Behams, Barthel and Hans Sebald, was distributed in more than 120 lots, out of which it would be hard to particularise. No. 192, "The Portrait of an Emperor," from Sir Peter Lely's collection; No. 217, "The Musicians"; No. 240, "The Little Jester"; and No. 245, "The Two Genii," in the first state, all by Hans Sebald Beham, are works of the greatest rarity.

A great many of the choicest prints of Sir Andrew seem, by the way, to have come to him from Sir Peter Lely. That bad painter was no mean connoisseur, and the plain P. L. within a circle, which denotes his ownership, does nothing to prejudice a print with an experienced buyer. The name of Baccio Baldini is one which commands more respect than his artistic merits seem to allow. His association with Botticelli on the famous 1481 Dante, accounts in some measure for this. So long as the early history of typography and wood-cutting is explored, Baldini's name will not die. Narford Hall had nothing much of this artist to show,—only a set of the "Prophets" (wanting ten out of twenty-four), and these not in their most valued state. Duplessis thinks that in the "Prophets" also he can trace the design of Botticelli. It is rather surprising to find but one Rembrandt in the collection. Others, perhaps, were sold at some earlier date; or perished in that cruel bonfire at "White's" which destroyed so many of Sir Andrew's treasures. The rage for Rembrandt is pretty old, whilst that for the little masters is comparatively new. Sir Andrew Fountaine, however, was a very surprising person. We have seen already how wisely he went to work collecting Limoges enamels and majolica, and medals of Pisano and Sperandio, whilst his silly countrymen were raving over bad copies of the "Eclectic" school, and over broken fragments of Roman "antique." A desire to be original in his line may account for his leaving Rembrandt upon one side. To make up for it, however, he made a fine collection of Dürer's prints, and gathered together a splendid lot of Vandyke's most treasured etchings. It may here be remarked that the ardour of any particular cult is determined more often by the amount of scope which it offers to pure connoisseurship, than by the attractiveness of the subject from a merely artistic point of view. Between the plate-mark of an etching and its margin there may be matter for a study no less minute, though it may well be less profitable, than that which the etched subject itself demands. Vandyke's etchings, whilst their splendid artistic qualities give them rank only second to Rembrandt's, present also infinite varieties of state and condition which make them a specially popular subject of study. If any unthinking person wants to be finally convinced that the last "state" of a plate, as of unregenerate manhood, is worse than the first, he has only to be shown those brilliant portrait-heads in their first or second states, as they came fresh from the needle of Vandyke, and then shown the later states of the same, in which his own work may be untouched, but the backgrounds have been filled in and various circumstantial details superadded. After Vandyke's death his plates came into the hands of his friend Van den Enden, and by him were republished; later, again, they were purchased by Gillis Hindrix, whose abhorred initials (G. H.) seen below the plate-mark cause the heart of a collector to shrivel within him. Looking over these portfolios we had rare opportunities of studying and comparing the "states." Space does not permit us to treat at length of other matters. A vast number of portrait engravings after Vandyke would interest chiefly the historian. Hollar was fairly represented. He, in Mr. Haden's view, to which we subscribe, was no more than a highly-skilled mechanic; yet, even so, some masterpieces of the etcher's craft would have been unknown to the world had it not been for his patient point. Such a piece of work was 616, "A Muff"; such, too, were his famous "Shells." A very rare portrait of "Vandyke with a Sunflower," in perfect condition, was among the finest of Sir Andrew's Hollars. Of German masters, we have made no mention of Burgkmair, nor of Brosamer, nor of the "little master," Jacob Binck, who, much to his advantage, has been confounded with the "Master I. B." Why the said J. Binck should have chosen to sign himself ⅃B (H. C. B.) whilst his own proper initials were thus sent a-begging, is a point we must leave men wiser and better to determine; and with only a glimpse at a complete set of Hogarth, and the remark that one may fail to be deeply impressed by the heavy work of Raimondi, and yet be in excellent company, we take leave of a collection which ere now has taken final leave of us.

THE INTERNATIONAL FORESTRY EXHIBITION, EDINBURGH.

THIS Exhibition, which is the first of the kind ever held, owes its origin to the Arboricultural Society of Scotland. The Society felt that the education of this country in the science of forestry had been very much neglected, and that, however much we might be in advance of other nations in many respects, in this one point we were far behind most of the other nations of the world. This was all the more to be regretted, seeing that we possess to a larger extent than any other nation, forests in every quarter of the globe, a fact which in itself implied that these are of varied character, and required different treatment. Owing to the difficulty in obtaining a site for the requisite buildings, it was not until March last that the plans of the building now erected were accepted, and these buildings are universally admitted to be well adapted for the end in view. The effect of this delay, however, has been that the time was insufficient, not only for the thorough completion of the building and its accessories at the period fixed for the opening, but it has deterred some in-

tending exhibitors from coming forward, and the exhibits of others were behind time. The result may, on the whole, be considered satisfactory, and the exhibition is really a very interesting one.

The Marquis of Lothian, in the opening address, expressed a hope that out of the exhibition might come a School of Forestry, and, if possible, that it should be located in Edinburgh. They had their Botanical Garden, their Arboretum, and their University, and they had the Highland Society, which had taken an interest in forestry matters, and they had abundant opportunities in the country for students learning practical and theoretical forestry. During the few months the Committee had worked very hard, and had done their best to make the exhibition practically useful and also attractive, but he was afraid that usefulness without attraction did not go for much sometimes, but let them hope that before long money would be forthcoming, and that they might see a School of Forestry in Scotland. The Lord Provost referred to the interest which the Town Council had, during the last three hundred years, taken in the University, and to the important duty they had performed in recently acquiring ground for an arboretum at a cost of about 20,000*l.*, and placing it at the disposal of the Government for the purpose of improving the education of the students, and ultimately with the object of providing a School of Forestry.

The building, designed by Mr. Robert Moreham, City architect, is simple in its arrangement and mode of construction, and is admirably adapted for its purpose. The only attempt at internal decoration has been the colouring of the arched principals which support the roof pale blue tint with stencilled ornament thereon. This is either too much or too little, and the effect would have been better had these beams been left uncoloured like the rest of the woodwork.

The first object that attracts the attention of the visitor on entering the building is a section of a "Californian redwood tree," 13 ft. in diameter, which forms a small apartment hung with photographs, showing the operations of the lumberers in the forests. In the adjoining transept are examples of the wood as applied to different articles of furniture, polished and unpolished, carved and inlaid; for all of which purposes the wood seems to be well adapted. The wood is generally of a deep red colour, but it varies considerably both as regards hue and grain. These trees are the grandest productions of nature's vegetation, sometimes having a diameter of 20 ft. and a height of 200 ft. before a branch is thrown out. The grove of these trees in the Yosemite Valley has been frequently described by travellers, but to see the tree in perfection and the forest in its most sublime aspect, the lover of nature must penetrate to solitudes whose depths have seldom or never met the gaze of civilised man. The outskirts of these forests are for a distance of about half a mile fringed by spruce and smaller trees, with here and there a few redwoods. It is in the depth of the forest that the true grandeur of the redwood is found, and where it usurps the entire possession of the ground. At first it is difficult to form an accurate idea of the magnitude of these monarchs of the forest, there is no scale by which they can be contrasted; tall and close together, they seek the upper light, often thirty or forty of them with diameters of upwards of 14 ft. being found upon a single acre. It is only within the last few years that the capabilities of this wood have become known, and the forests once given up to solitude and the Indian now resound with the stroke of the axe and the grating of the saw. A ready market is found for the wood in Chicago and the Eastern States, which is now extending to Europe. The wood is found to be adaptable to outside work as well as to internal fittings, and to be durable and free from shrinkage.

Demolitions in Blomfield-street.—The Corporation have just made a clean sweep of the buildings on the south side of Blomfield-street, extending to about half the entire length of the street, in the direction of the North London and London and North-Western Railway stations, and to a considerable depth eastward, the site thus cleared being nearly an acre in extent, which is now announced to be let on building leases.

GUILDFORD ART LOAN EXHIBITION.

AFTER the stimulus that has been given to exhibitions of all sorts, by the first and most brilliant of them all, that of 1851, the English public has been so often invited to visit collections drawn from the inexhaustible sources of private as well as public wealth, that it requires some special element to give to any local display the chance of success. There is, indeed, only one way in which a local exhibition, not of enormous dimensions, is likely to attract any other than strictly local notice, and that is when local associations, of historic moment, can be appealed to and illustrated. In this respect the county town of Surrey may be said to be not unworthy of its position. Its structural memorials go back to a date long antecedent to the Conquest. The "strips" on the tower of its most ancient church savour of Saxon building; and the small double-splayed windows of that part of the sacred edifice appear to have been constructed to keep out the sacrilegious invader. It was down the Wey that the bier of the fair Elaine floated; Guildford Castle, with its ancient herring-bone brickwork, has traditions of Alfred; and the spot is identified with the Astolat of the poet. In the neighbourhood are such historic sites as Wotton, still held by an Evelyn; Sutton, with its noble chapel, occupying the first floor of an entire wing; Losely, with its Elizabeth windows, and its memorials of the Mores. The muniments, plate, pictures, and other articles of interest, from houses such as these, the regalia and records of the corporations of Guildford, Godalming, and Farnham; and the objects of interest lent by the houses of Percy, of Onslow, and other neighbouring families, are such as to make this loan exhibition worthy both of visit and of record.

Among the paintings ascribed to "Old Masters," which head the Fine Art Section of the catalogue, are a few of undoubted authenticity and merit. Such are the portrait of Cardinal de Retz, after his return to France on the death of Mazarin, by P. de Champagne; a small, but beautifully-distinct view of London, by Canaletti; portraits of the regicides Bradshaw and Cromwell, by Dobson; of Lord Walpole, of Wolterton, by Denner; of Charles I., attributed to Vandyck; of Horace Walpole, by Hogarth; and a wonderful head of an old woman, from the Orleans Collection, by Denner. The claims of the portraits of Edward VI., of Sir T. More, and of Wolsey, to be from the pencil of Holbein, may perhaps be better avouched by the records of Losely, whose owner lent them, than they would seem to be at first sight. One portrait is in itself enough to repay the cost of a visit to the exhibition. It is a head of Dr. Johnson by Gainsborough, the property of Sir J. Whittaker Ellis; a portrait that goes far to show the nobler and more tender aspect of a rugged character which has been obscured by the incense of Boswell.

Of the collections of modern oil pictures, crayons, and water-colour drawings; of the groups of works by Morland and by Russel, the latter a local celebrity; of the deeds, MSS., &c.; of seals, autographs, coins, and medals; of ancient printed books and manuscripts; of porcelain and pottery; of needle-work, embroidery, and tapestry; of articles of plate and bronze; of neolithic and palæolithic stone implements; and of miscellaneous articles, we have no room to speak. Under each head are ranked very interesting specimens. The sword left by Charles I. at Weston, the seat of Sir Richard Halford, the night before the battle of Naseby; two ivory chairs taken from Tippoo Sahib's tent; and some fine bronzes are lent by her Majesty the Queen. A case contains a selection of silver and gold-plate vases and other objects from the wedding presents to their Royal Highnesses the Duke and Duchess of Albany. The Guildford Corporation plate, comprising an ebony staff with silver top, presented to the town by Queen Elizabeth; a silver mace presented by the High Steward,—one of the Howards,—in 1663; and another mace, of great but unknown age (which the occurrence of a single plume, like the centre feather of the three in the Prince of Wales's plume, may, perhaps, enable the expert to fix), and other objects, are lent by the Corporation. But, whether it was due to the good lighting or to the excellence of the sculpture, nothing has lingered longer on the memory of the writer than two marble busts lent by the Duke of Northumberland,—one of Mr. Spencer Perceval, thoughtful and delicate; and one of Lord Melville, the forcible classic features of which recall to mind the lines,—

> "in whom
> The ancient Roman honour more appears
> Than any that draws breath in Italy."

THE EFFECTS OF FROST ON BUILDING STONE.

THE study of the above question has led to many detailed investigations, without precise and definite results having been arrived at. The only indications of any exactness are those which have proceeded from lengthened observations of materials employed in climates and under circumstances analogous with those for which it is proposed to draw inferences from practical experience.

In bringing forward, in the *Revue Industrielle*, some connected details upon various branches of this subject, M. Braun remarks that nothing definite is proved by the statements made at a certain period respecting sulphate of soda. It has often happened that stones which have resisted expansive force, have later on given way under the influence of frost, while the contrary has sometimes been remarked. It must not, however, be concluded if stone has for a length of time resisted the effects of frost, that it will do so for an indefinite period. The case of the stone bridge at Borrège, cited by Vicat, is a striking proof bearing on this point.

After calling attention to the fact that the effects of frost are often confounded with other causes of deterioration to which stone is liable, M. Braun endeavours to define in an exact manner the question under discussion, asserting that a stone is affected by frost when its resistance to longitudinal traction is less than the force of expansion of the water contained in its pores at the moment of its transformation into ice.

The *Journal du Céramiste et du Chaufournier* remarks that this theory requires certain modifications in practice. It is, however, admitted that, supposing this definition to be exact, it furnishes a provisional solution of the problem, and would allow of the resistance of a stone to frost being ascertained without exposing it to a practical test. According to mechanical theories, a kilogramme ($2\frac{1}{5}$ lb.) of water in freezing develops an amount of mechanical labour equalling 33·681 kilogramme-mètres (243·51 foot-pounds). This knowledge of the force developed by water at the moment of its changing its condition would enable the resistance of a stone to frost to be estimated if there were also known,—1, its density; 2, its porosity; 3, its resistance to longitudinal traction. Thus, if the quantity of water contained in a cubic centimètre (·061 cubic inch) of a stone does not produce in congealing a force superior to its resistance to traction per square centimètre (·15 square inch), the stone would not be affected.

Unfortunately, however, matters are not so simple in practice. The principal elements of perturbation are (1) the want of homogeneousness in stones; (2) the state of superfusion of water, which is often produced in the interior of stones; (3) the chemical action of the waters of the quarry. The first point is too well known to call for detailed reference. The capacity for absorption of water which is possessed by stones from the same quarry (or even from the same part of it) varies to such an extent as to render it difficult to fix *à priori* what is the quantity of water the expansive force of which in congelation has to be estimated.

The circumstances under which the longitudinal traction takes place must not be lost sight of. M. Braun, relying upon Hodgkinson's experiments, considers that the figures arrived at in the tests of traction should be reduced by one-third. As the complete rupture is always preceded by a disaggregation which is indicated by fissures, and as these fissures are generally produced under a burden which varies between one-third and one-half of that necessary for the total rupture, it would be necessary, in view of these facts, to introduce a new co-efficient of reduction, comprised within the limits indicated. This *co-efficient of broken equilibrium*, as M. Braun designates it, must be always attended by uncertainty in its determination, according to the opinion expressed by the journal already mentioned. As a

summary of his investigations, M. Braun gives this formula:—

$$(C + C_1)\ R \gtrless 33{\cdot}681 \cdot A.$$

C = The co-efficient of reduction as deduced from Hodgkinson's experiments.
C_1 = The co-efficient of broken equilibrium.
R = The average burden per square centimètre, which determines the rupture under the action of longitudinal traction.
A = The quantity of water contained in a cubic centimètre of stone and expressed in grammes.

When the first number of the above is superior to the second, the stone is fit for building purposes. When the contrary is the case the stone should only be used in situations where it is not exposed to frost.

It is admitted, in conclusion, that M. Braun's ideas are both new and original, displaying, at the same time, such an amount of probability as to render it possible for them to mark a new point of departure in experiments bearing upon the subject under discussion, notwithstanding the speculative nature of some of the principles enunciated.

Illustrations.

DESIGN FOR A MODEL THEATRE.

THE fundamental principle of this design for an ideally perfect theatre, which obtained the first prize at the Berlin Health Exhibition of 1883, has been the arrangement of the building in detached groups, allowing of an easy and general supervision. The advantages of such a disposition would seem to be,—1, The separation, as far as possible, of the auditorium and the stage; 2, The provision of easy and rapid modes of entrance and exit for the audience; 3, In cases of fire facilities for localising the flames and attacking them from all sides at the same time; 4, The external lighting of the auditorium, the staircases, and most of the rooms belonging to the stage; 5, Economy of space both on the stage and in the auditorium.

The central point of the whole design is the circular auditorium with its three staircases. It gives access to open courts on four sides, and beyond these it is surrounded by the main vestibule and the foyer in front, by three rehearsal rooms, the manager's room, &c., on the two sides, and by the stage behind.

The stage is so arranged that only the most necessary apartments are actually contiguous to it. The dressing-rooms, property-rooms, and workshops lie on either side, but they are isolated by means of corridors. The painting-room is above the back of the stage, and in the further corners of the building are two large store-rooms, separated from the stage by small open courts.

The principal entrance to the theatre leads direct into the main vestibule, which communicates easily with the smaller vestibules on either side of the auditorium, intended for the use of the gallery portion of the audience.

The staircase leading from the main vestibule is intended for the use of the audience in the area of the theatre, and on the first and second tiers of boxes. The two side staircases lead to the galleries. The staircase from the vestibule, however, also goes up to the top gallery, in order to afford easy communication between the upper stories and the foyer, and to be used by the gallery audience in case of panic. Extra staircases, to be used in cases of emergency, are approached from open *loggie* on each floor and lead down to the four open courts, and thence through passages direct into the street.

The auditorium is thus seen to be completely isolated, surrounded by four detached groups of buildings, giving access on four sides into open courts provided with extra staircases for the safety of the audience. The open *loggie*, extending along the side of the courts on each floor, serve to disperse the audience as far as possible in cases of panic, and in summer they can be used as places of refreshment; each of them is capable of containing 200 persons.

The front area of the auditorium seats			306	persons.
The back	,,	,,	274	,,
The first tier above	.....	,,	142	,,
The second	,, ...	,,	244	,,
The third	,, ...	,,	364	,,
The fourth	,, ...	,,	370	,,
Total	.....		1,700	,,

Access to the stage is given as follows:—

The staircases for the actors, singers, &c., male and female, are in the group of buildings on each side of the stage, and completely separated from the entrances for the workmen, machinists, and scene-painters, which lie behind the stage.

The entrance to the manager's room and offices are in the second group on the right of the auditorium. Extra staircases for the actors open from the galleries in immediate proximity with the dressing-rooms.

The stage is 24 mètres long by 17 mètres deep and 34 mètres high. Corridors extend along either side partly as means of communication with the stage, partly as convenient and protected posts for the firemen and their machinery. The stage is roofed in by a dome constructed of pantiles, and covered with a second roof of iron. This device affords, in the opinion of the designers, a security against the falling in of the roof, by providing, in any case of fire, a cool current of air between the dome and the iron outer roof. The central opening on to the stage serves for ordinary ventilation, the four side openings for the issue of heat and smoke should fire break out on the stage.

The flies, consisting of four stories, have grated floors, and a considerable open space is left above, calculated to check the progress of fire and to diminish the danger of the falling-in of the roof.

In providing for the separation of the stage from the auditorium in case of fire, the authors of this design have kept in mind the danger attendant on the use of an iron drop which, as soon as it becomes heated above a certain point, falls and leaves free passage to the flames. They believe they have obviated the danger by designing the construction of two iron drops, a lighter one as an act-drop, and a heavier one for use at the conclusion of the performance, each completely independent of the other, and under the direction of a fire-inspector. The fire-inspector's room is between the two drops and in direct communication with the fire-engines and the water supply, so that in case of need the iron curtains can be continuously sprinkled with water, and their over-heating prevented.

The front stage is separated from the back by an iron wall, which is hollow and filled with water, and can be raised and lowered by hydraulic pressure. There are, of course, doors in all the three drops for use in case of need.

The storerooms are in two stories and very strongly constructed. They are in easy communication with the back stage and the painting-rooms above.

The ventilation and heating of the theatre are designed by Herr J. Strebel, engineer, of the firm of R. O. Meyer, Hamburg. They are on a very complicated and perfect system of hot-air and steam-pipes, and provision is made for the introduction at an equable temperature of hot air, moistened by steam. The stage, property-rooms, dressing-rooms, corridors, &c., are each provided with stoves or coils, for steam or hot water, and the whole apparatus is so constructed as to be easily under control in case of fire or accident. The boilers and steam-engines are located in the basement for the better safety of the building. The employment of steam both as a purifying and a heating medium renders this isolation of the machinery and apparatus possible, since it loses but little either of heat or pressure by its passage through any length of pipes.

The design for ventilation cannot be explained in detail without the aid of diagrams. It provides for a change of the air on the stage every half-hour, and for an hourly supply of 25 to 35 cubic mètres of fresh air per head in the auditorium.

There is an abundant water supply with separate systems and cisterns for the ordinary purposes of the building, for the extinction of fire, and for use on the stage, all of which could be utilised at any given point within a very few minutes.

SKETCHES BY THE LATE G. E. STREET, R.A.

THESE are photolithographed from two others of the set of pencil sketches by the late Mr. Street, of which we gave two last week. They are reproductions of the lines of the originals, though the peculiar *texture* of pencil work cannot be reproduced in lithography.

PULPIT IN CHURCH OF SAN LORENZO FUORI LA MURO, ROME.

THE lithograph of this effective example of inlaid work in marble is from a drawing of it made on the spot by Mr. R. Barratt. The design, with its hard straight lines and flat surfaces, is thoroughly suited to that class of work, and it is judiciously raised on a plain solid base of masonry which sets off the inlay work above and, at the same time, prevents the whole from appearing too slight or deficient in monumental character.

SILSDEN MECHANICS' INSTITUTE, YORKSHIRE.

THIS building, of which we give an illustration, is now in course of erection, by local contractors, and is intended to be opened in September.

On the ground floor are a reading-room, 19 ft. by 19 ft.; news-room, 24 ft. by 16 ft.; conversation room, 24 ft. by by 14 ft.; lavatory, shop, and living room.

On the first-floor are an assembly or lecture room, 48 ft. by 30 ft., and retiring or class-room, 19 ft. by 19 ft.

The contractors are,—for masons' and brick-work, Mr. Joshua Tillotson, Silsden; joiners' work, Mr. Frank Cowling, Silsden; plasterers' work, Messrs. Laycock, Silsden; plumbers' work, Mr. B. Newbould, Keighley; slaters' work, Messrs. Hill & Nelson, Bradford; and painters' work, Messrs. Tillotson & Harrison, Keighley.

The stone is fine sandstone from neighbouring quarries,—the ashlar being tooled and the wall stones fine hammer-dressed. The joiners' work is all of the best red deal, and will be painted plain colours. The rooms are intended to be warmed by a low-pressure hot-water apparatus by Messrs. Clapham Bros., Keighley.

The architect is Mr. W. H. Sugden, of Keighley, who has contrived, we think, to give a good deal of character to a simple and inexpensive building.

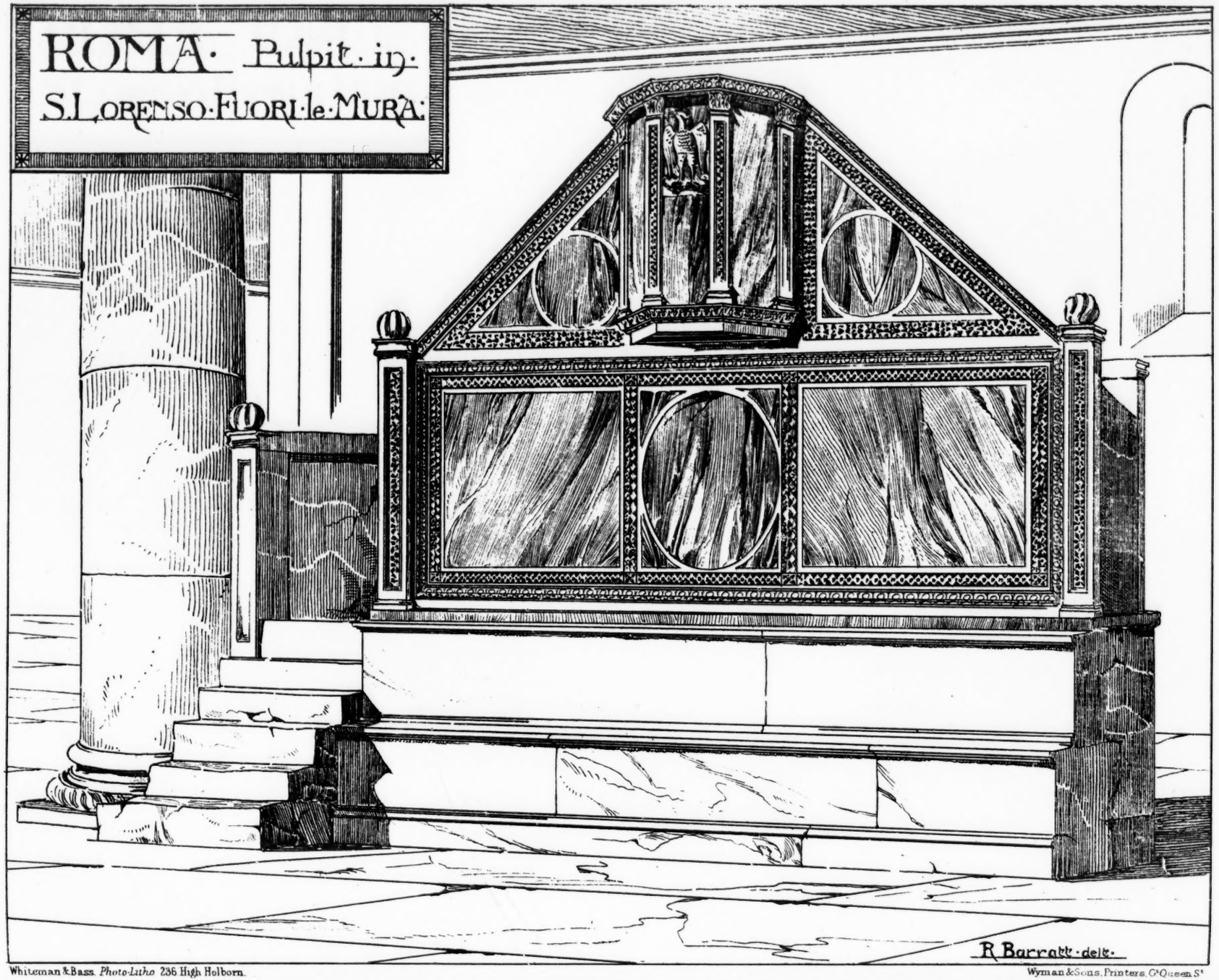
Cholera and Cowardice.—It is a most deplorable proof of the weakness of human nature that it is at all times prone to fall into a state of panic when brought face to face with the inevitable. We must all die, and we are not ignorant of this our destiny; nevertheless, the instant a danger to life is recognised, we fly from the peril with the impetuous haste of crazy and cowardly creatures, forgetful alike of duty and decency. It is vain to argue in favour of self-possession. Philosophy has no charm for, or power over, the man who impulsively turns his back to the enemy. Nothing we could urge would have the slightest weight with the multitude bent on escaping from the ports and cities which are just now supposed to be rife with infection of cholera. These flying crowds, on safety all intent, must be left to their own devices. It is manifest that they will spread the malady, and it is scarcely less certain that they will, many at least, lose their lives in trying to save them. With regard to these matters, however, it is useless to speak. Suffice it to point out that, although in the presence of an epidemic of cholera, there is always and unquestionably some personal peril of contracting the disease, it is by no means certain that this is increased by remaining in association with the sick, or that the danger is to be avoided by running away. During severe epidemics it has been noticeable that the mortality has not been, by any means, greatest in the very *centre*, so to say, of the disease. In the hospitals and among the cholera patients scattered throughout the population, medical officers and nurses have gone about doing their duty with no greater mortality than that of those who have kept aloof. Indeed, it is probable that a certain amount of immunity from disease has been enjoyed by those who have not feared the danger of infection. The great secret of success in warding off disease is the preservation of health. We mean that if, heedless of danger, men and women do their duty to those around them,—keeping up a cheerful temper and a trusty spirit, neither abusing the good things of life nor avoiding them,—in short, living as all should live, whether in the midst of a healthy population or in the presence of an epidemic,—they have a far better chance of escaping disease than by falling into a state of panic and "hastening to leave."—*The Lancet.*

ST. QUENTIN, SOUTH TRANSEPT.

FROM A SKETCH BY THE LATE G. E. STREET, R.A.

C. F. Kell Photo-Lith. & Printer, 5 Castle St. Holborn, London, E.C.

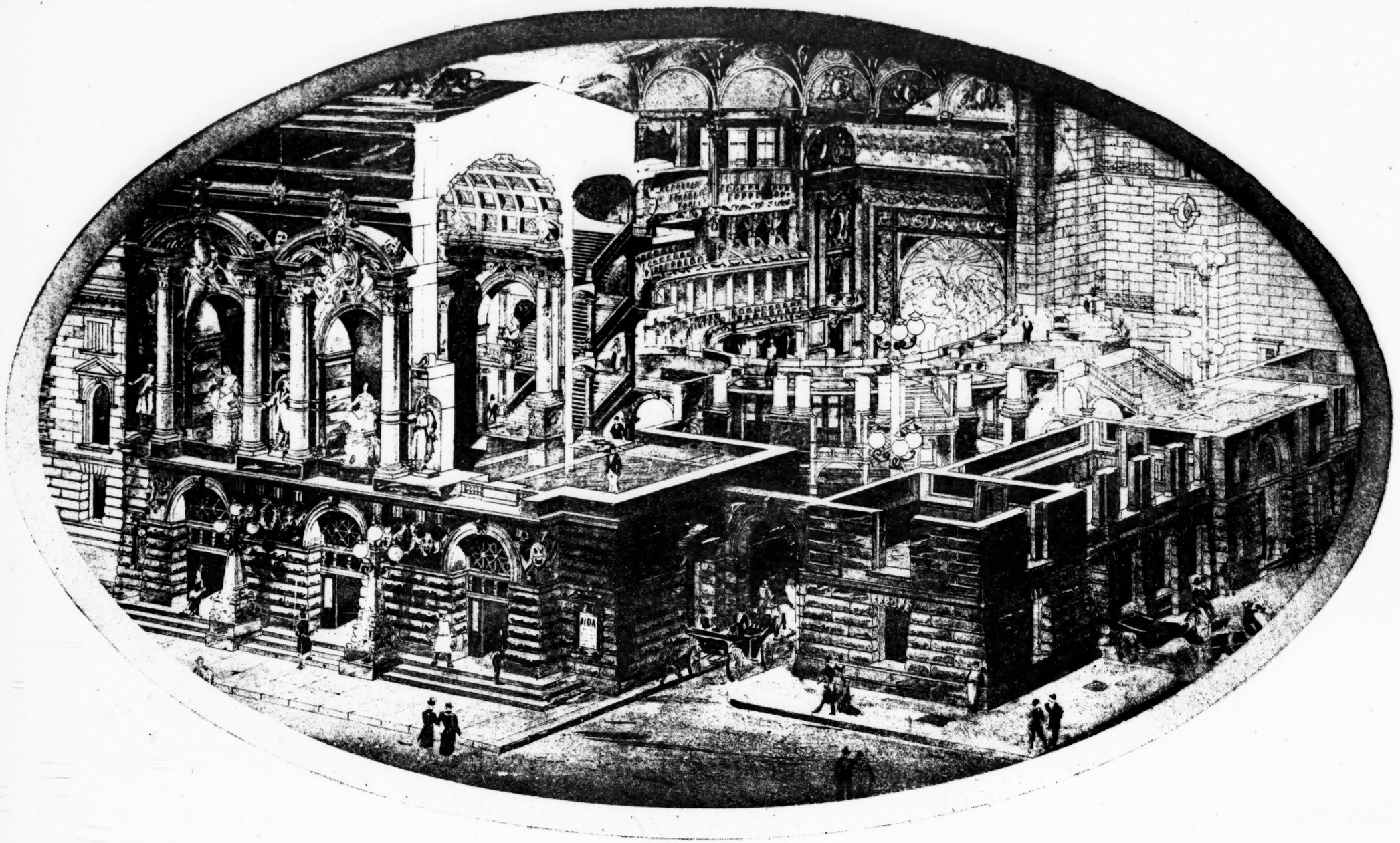
ROMA. Pulpit in S. Lorenso Fuori le Mura.



R. Barratt. delt.

Whiteman & Bass. *Photo-Litho* 236 High Holborn.

Wyman & Sons, Printers, Gt Queen St.

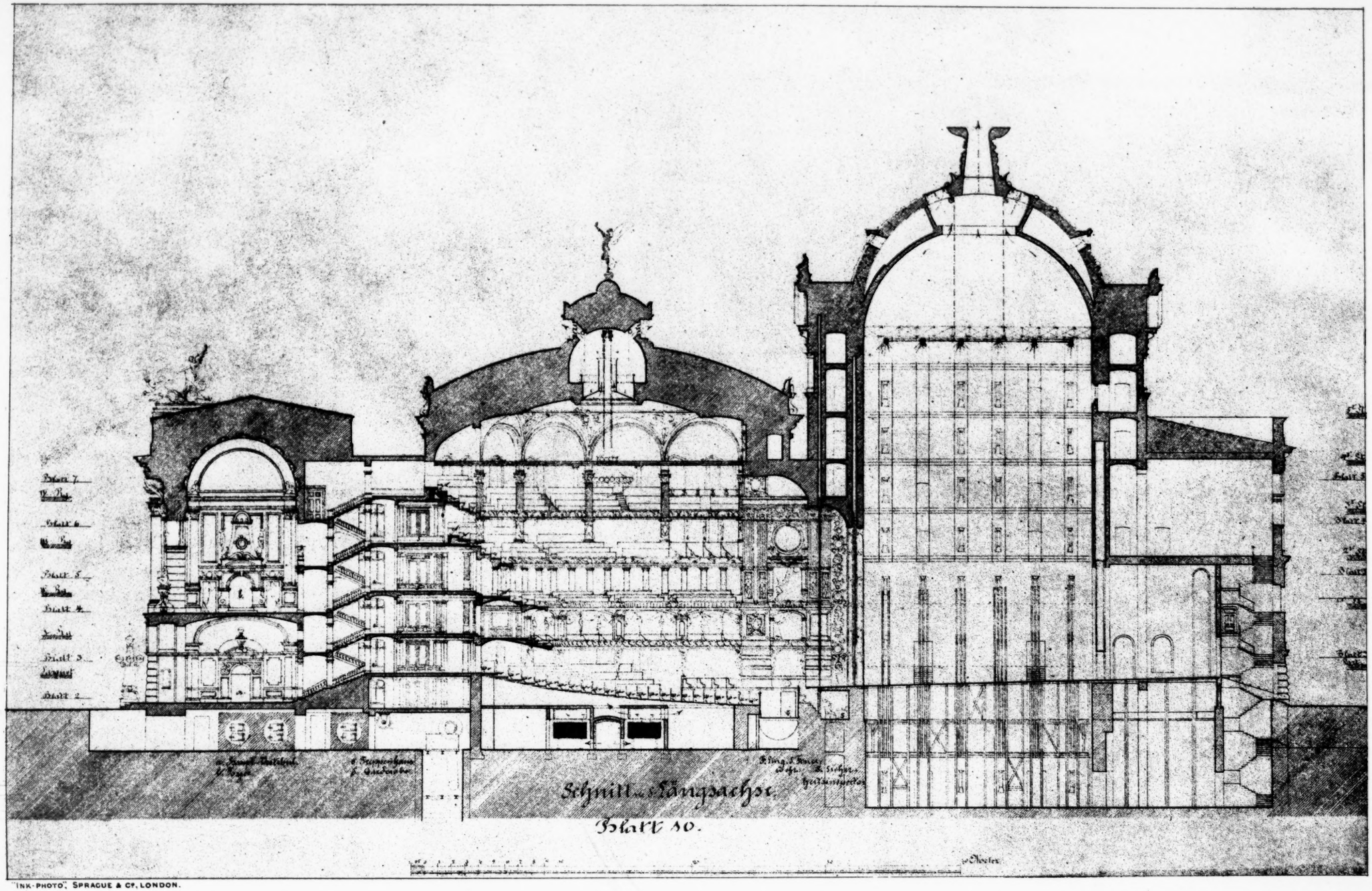


"INK-PHOTO." SPRAGUE & Cº. LONDON.

PRIZE DESIGN FOR A THEATRE. HYGIENE EXHIBITION, BERLIN, 1883.

PERSPECTIVE SECTION.

MESSRS. SCHMIDT & NECKELMANN, ARCHITECTS.

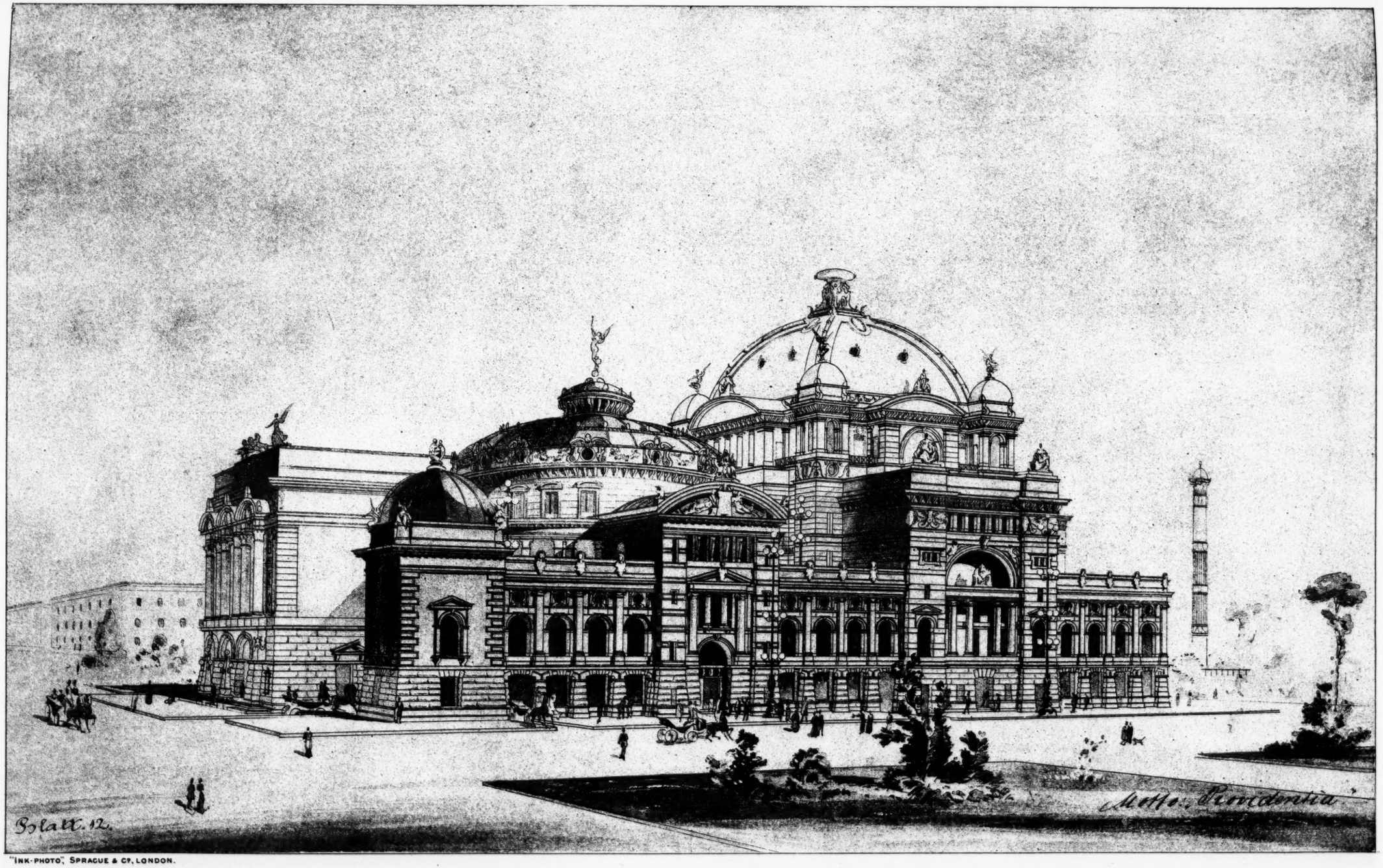


"INK-PHOTO." SPRAGUE & Cº, LONDON.

PRIZE DESIGN FOR A THEATRE. HYGIENE EXHIBITION, BERLIN, 1883.

LONGITUDINAL SECTION.

MESSRS. SCHMIDT & NECKELMANN, ARCHITECTS.

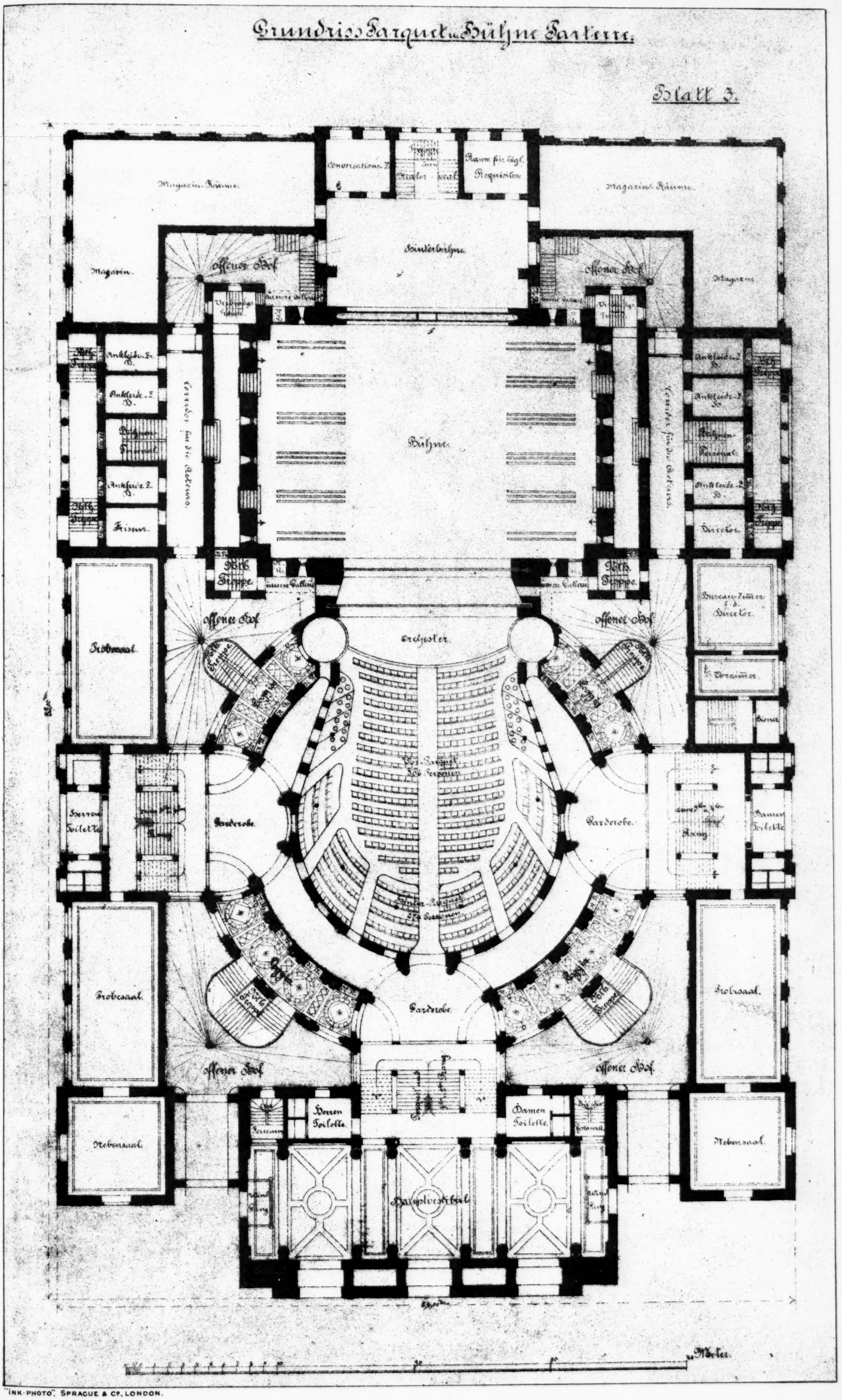


"INK-PHOTO", SPRAGUE & Cº, LONDON.

PRIZE DESIGN FOR A THEATRE. HYGIENE EXHIBITION, BERLIN, 1883.

VIEW OF EXTERIOR.

MESSRS. SCHMIDT & NECKELMANN, ARCHITECTS.



"INK-PHOTO" SPRAGUE & Cº, LONDON.

PRIZE DESIGN FOR A THEATRE. HYGIENE EXHIBITION, BERLIN, 1883.

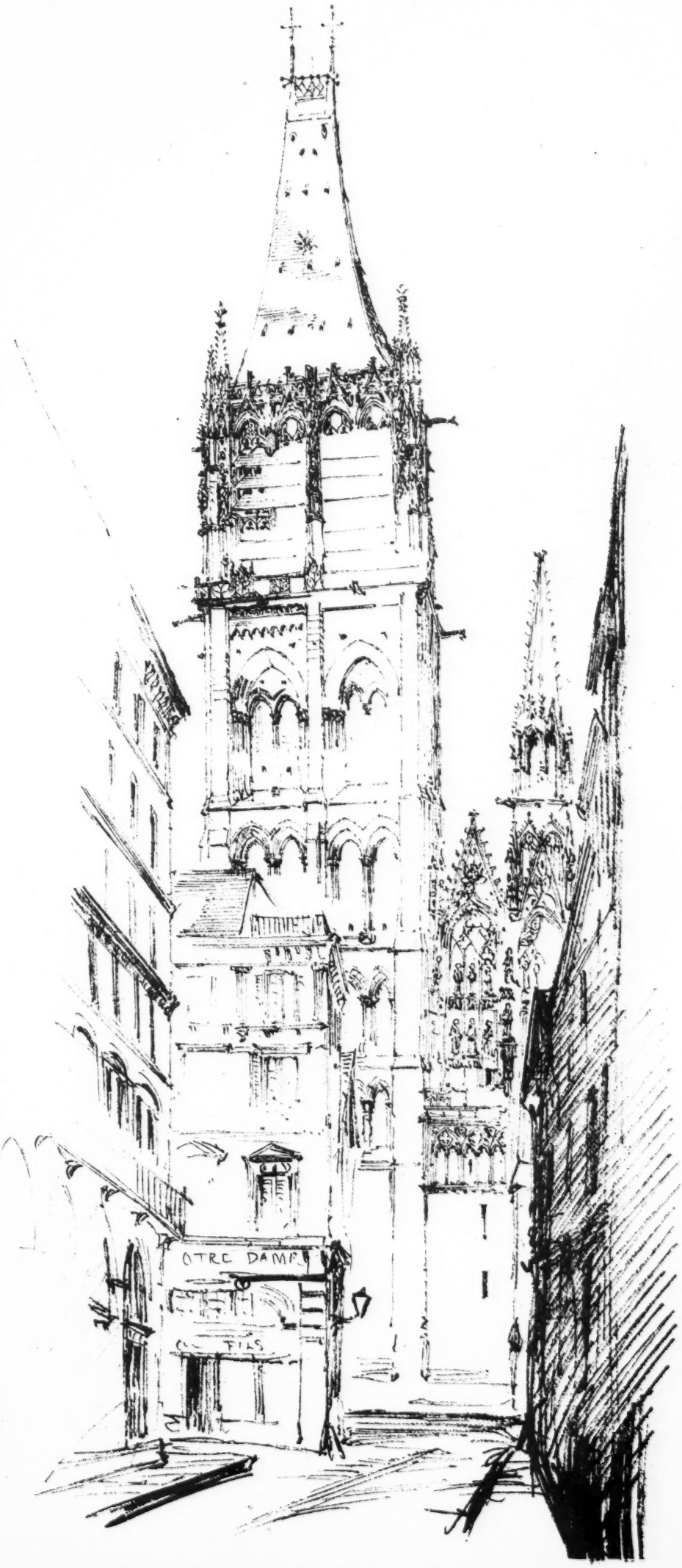
GROUND PLAN.

MESSRS. SCHMIDT & NECKELMANN, ARCHITECTS.

Wyman & Sons, Photo-Litho

C° Queen S^t London W C

MECHANICS' INSTITVTE . SILSDEN, YORKS . J. B. Bailey & W^m H. Sugden . Architects.



ROUEN CATHEDRAL: N.W. TOWER.

FROM A SKETCH BY THE LATE G. E. STREET, R.A.

C. F. Kell Photo-Lith & Printer, 8, Castle St. Holborn, London, E.C.

HEALTH EXHIBITION LECTURES.

FOUL AIR IN HOUSES.

A LECTURE was delivered by Professor Corfield at the International Health Exhibition on the 4th inst., on "Foul Air in Houses." Dr. Heron presided, in the absence of Sir P. Cunliffe Owen.

The lecturer introduced his subject by observing that it was one in which all should take an interest. He then proceeded to show the result of breathing air highly contaminated by the respiration of human beings, referring to the catastrophe of the Black Hole at Calcutta on June 20, 1756, where 146 persons were confined for ten hours at night, and 123 were found dead in the morning, while twenty-three of the survivors were covered all over with boils, and in what was called a high putrid fever. Typhus, or gaol disease, was a characteristic of places where there was overcrowding. There was another disease prevalent under such circumstances, namely, consumption. Dr. Guy mentioned an instance of printing-works in which the workers had only just 200 cubic feet of air each, and they died of consumption as fast as if they had had typhus fever. Now, what was the reason why air that had been breathed was unfit to be breathed again,—why rooms that contained air that had been breathed over again were so injurious to health? Was it the diminution of oxygen in the air? The amount of oxygen in badly-ventilated rooms was 2,080 or 2,075 parts in 10,000 of air. The instances were very rare where it was reduced below 2,070. So that the diminution of oxygen was very small. Then that was not sufficient to account for the deleterious results he alluded to, and neither was the increase of carbonic acid, although poisonous. The prevalence of typhus fever and consumption was undoubtedly attributable to the foul organic matter, and the excessive moisture in the air. They were able to estimate the amount of air required by each individual in an hour. That amount was 3,000 cubic feet, so that if he remained in a room seven hours, he would require 21,000. He could not get that in any ordinary-sized room, and so the air required changing. If the atmosphere of a room was in such a condition that a disagreeable sensation was experienced on entering, that was evidence of the presence of putrescible organic matter. The results observed from the entrance of air from drains into houses, whatever way it got in, was the appearance of certain diseases, such as sore throats, diphtheria, scarlet fever, diarrhœa, typhoid fever. Foul air got into houses from bad appliances or from defective arrangements of good appliances, from using things that were out of order, and still more from the disuse of things. New drains were often made of porous materials, which allowed foul water or foul air to pass out. They were feequently made of bricks and mortar, which were very improper materials for such a purpose. The presence of rats was to be regarded as a serious sign, and as a sign that in all probability the drains were out of order. Besides, these rats took some amount of filth from the drain, and very likely they got into the larder. But rats might get into a house through the imperfections of the drains of neighbouring houses. A curious instance of this occurred in a house in which the pipes were imperfectly joined together. A layer of concrete was used by the occupants to cover up the pipes instead of taking them out altogether. The rats made their way into an adjoining house in which the drains were in an excellent condition and made a place under the hearthstone, where they lived and died, and whence they ran all over the house, and had a very nice time of it. When the hearthstone was taken up there were found the remains of thirty-six rats in various stages of decay. That was a curious instance in which a man who did not attend to his own drains might be a nuisance to his neighbours. Foul air often got into houses from pipes which were not properly made. Not infrequently the pipes were laid the wrong way. Instead of being laid with the socket upwards they were laid with the socket downwards, and thus the water ran out and the drains were stopped up. If the pipes were joined with cement that was an excellent plan, but it might be done inefficiently; for instance, the cement might be put round the top of the joint and nothing underneath. Dust-bins were too frequently placed near the walls of houses, and thus foul air passed into the dwellings, first into the basement and next into the upper rooms. Very often connexions were made with the drains from the floor of the house. Openings were made in the drains and they were provided with some kind of trap. A very common trap was the bell-trap, which, a few years ago, was to be found in every house in London. This was a kind of trap which should not be tolerated inside of a house, especially if connected with a drain. Soil-pipes were the pipes into which water-closets discharged. They were very frequently placed inside houses, and often not ventilated. One of the best materials for them was lead; but lead was not the best material if they were not ventilated. Foul air had a propensity to eat through solid lead where the pipes were not ventilated, and thus the foul air escaped into the house, and sore throats and other diseases were the consequence. Dr. Corfield showed examples of soil-pipes which had been eaten through by foul air, and went on to say that they should be ventilated at the top. Ventilators of soil-pipes were not infrequently carried near to windows of sleeping-rooms, and disease was the result. Where there was a foul smell the best way was to throw down some oil of peppermint into the suspected drain. In the case of one country-house he knew of, this had been tried on a soil-pipe in which, in spite of the escape of peppermint, no defect could for a long time be found; but ultimately the wall was opened, and one portion of the pipe was found there which had been struck by a workman with his chisel, and a hole left in it, through which the foul air escaped and wandered through the floors into quite a different part of the house. The most common kind of closet used in houses was the pan-closet, but that was about the worst form of sanitary arrangement ever put into a house. They might have the best arrangements for ventilation, but if there were a pan-closet there was sure to be a nuisance, especially if they had a D-trap under it. This form of apparatus should not be tolerated anywhere. There should be syphon-traps on the soil-pipes; and waste-pipes should not be connected with soil-pipes. Rain-water pipes were frequently placed inside houses; they passed through the bedrooms, perhaps through the drawing-room, through the dining-room or hall, and through a room in the basement to the drain. Proper care was not taken to see that the joints were made air-tight, because they were only the joints of rain-water pipes. But foul air from the drains came up from the rain-water pipe through such leaky joints and passed into the rooms. Lead rain-water gutters were not infrequently taken from the outside of a house through the top rooms. He had known cases of disease caused by rain-water gutters passing under the floors of rooms. Waste-pipes of cisterns were not uncommonly connected with drains or soil-pipes, and so foul air got into the cistern. The best plan was to cut off the waste-pipe and make it discharge into the open air. Foul air frequently travelled about houses by means of tubes through which the bell-wires ran. This was a fact which was not so much attended to as it should be. He had known instances where the rooms had become uninhabitable from the foul air passing through those tubes. Foul air was not uncommonly produced by a slight escape of coal gas, through the gasfittings not being perfectly air-tight. The smell caused by this was very peculiar, and it was not easy to detect. Whenever there was a doubt as to a peculiar smell in a room the gas-pipes should be tried. He did not mean that they should try with a light, for the escape would be too slight for that. Coal gas contained carbonic oxide, one of the most poisonous of gases. It was through this slight escape of coal gas that headaches were often produced. Foul air from drains sometimes got into larders, and so affected the food. It was not uncommon for soil-pipes to pass downwards through the larder. Milk rapidly absorbed foul matter from the air and became poisonous. It was exceedingly dangerous to have in a house sanitary apparatus not in use. Foul air came in through them. Dr. Corfield mentioned a case, by way of illustration, of a large school-house formed by two houses being thrown into one. The sanitary arrangements were thought to be perfect, but in one of the houses was a sink that was not wanted. The scullery was not used, and the foul air that came through the sink and from the bell-trap was "enough to turn a windmill."

A cordial vote of thanks was passed to the lecturer.

THE PARKES MUSEUM.

THE annual report of this valuable Institution, adopted at the general meeting held at the Museum, 73A, Margaret-street, Regent-street, on Wednesday last, observes that "the first year of the occupation of its new premises by the Parkes Museum has been mournfully marked by the death of the President, H.R.H. Prince Leopold, Duke of Albany. This event has been an incalculable blow to the progress of the Museum.

The able address which His Royal Highness delivered at the opening of the Museum in May, 1883,* was an evidence alike of the sympathy which he felt for Sanitary Science, and of the importance which he attached to the diffusion of that branch of knowledge through the country. The Council feel that in losing His Royal Highness they have lost a President who had the interests of the Museum deeply at heart, and who would have spared no effort to render it worthy of the objects for which it was established. The Council have carefully considered the question of electing another President, but they think that it is undesirable to take steps in this matter at the general meeting of this year. The Council have the satisfaction of being able to report that the Museum has made a considerable advance during this, its first year in the new building.

In January of this year, Dr. Louis Parkes, nephew of Dr. Parkes, in whose memory the Museum was founded, was appointed honorary librarian, and he has since his appointment devoted himself to a more regular classification and complete labelling of the books, reports, and pamphlets contained in the library, so that any volume sought can now be found more readily than had hitherto been the case; in addition to this, the work of cataloguing the library has been taken in hand, and is now in an advanced state of preparation. Numerous and valuable presentations have been made to the library during the last year; but to mention here even a few of the names of the munificent donors would occupy more space than could be spared in this report. The total additions to the library since June, 1883, have amounted to about 530 volumes; and the present collection, in point of numbers and of extent of subjects embraced, forms a very valuable library of sanitary literature.

The library and reading-room, although now open to the student on the payment of the small fee of 5s. a year, has not been so largely frequented as might have been anticipated, when its numerous advantages are considered. The Council are deeply indebted for many services rendered to the Museum by its honorary officers.

During the year the Sanitary Institute of Great Britain and the National Smoke Abatement Institute have been provided with office accommodation in the building, and a space in the Museum has been set apart for the exhibition of smoke abatement apparatus. Although these two societies have not in any way amalgamated with the Museum, it is felt that, their field of labour being so similar, this association of offices will be beneficial to all, and will also prove an advantage to the public generally.

Since the opening of the Museum in its present premises, the number of members has largely increased. The members numbered 99 on the 30th of June, 1883, just after the opening of the Museum. They now number 260. During the year the Museum has been visited by 6,870 people.

The financial position of the Museum is not as yet so firmly established as the Council could wish; but they feel assured that if the members would evince their interest in the Museum by bringing the good work that it is accomplishing under the notice of all the various people with whom they are brought into connexion, both in business and otherwise, so as to add to the number of members, they have reason to hope that the income of the Museum would be sufficient to carry out its objects with even more usefulness than at present.

All things considered, the Council are able to look back upon the first year's work of the Parkes Museum with considerable satisfaction.

The utility of the Museum has increased month by month. The Museum has clearly

* Reported in full in the *Builder* at the time.

met a great public want, and the Council would again strongly urge upon the members, and upon all who are interested in sanitation, to use their personal influence, so to increase the number of members and life members that the future of so valuable an institution may no longer be a matter of doubt."

ACTION FOR THE RECOVERY OF ARCHITECT'S FEES.

TOMLINSON *v.* BARNETT.

ON Tuesday last, this case came up for judgment before Mr. Justice Field.

The plaintiff, an architect, of 35, Great James-street, Bedford-row, W.C., brought an action for the recovery of fees for plans, &c., for erection of houses at Sutherland-gardens, Maida-vale, and for a further sum promised him for extra supervision, in consequence of the failure of the builder to perform his contract. The total sum claimed was 167*l.* 7s., and the defendant, who described himself as an engineer, put in a counter-claim to the amount of 2,000*l.* for alleged negligence. The defendant had by order previously paid into Court 100*l.*, beside the sum of 27*l.*§10s. obtained by the plaintiff on account, and it having been agreed that the plaintiff was entitled to the sum of 91*l.* 7s. for plans, &c., and a fair sum for extra supervision from the time of the builders leaving the works until completion. Mr. Henry Hunt, of 45, Parliament-street, Westminster, was appointed referee to report on this and upon the counter-claim. The evidence showed that the plaintiff had been put to considerable annoyance, having been held responsible by several firms for goods supplied for the defendant's houses. Mr. Hunt reported that the plaintiff was entitled to the sum of 26*l.* 5s. for extra services, and that the defendant was not entitled to anything on his counter-claim. His lordship entered judgment, with full costs, for the plaintiff accordingly.

CASE UNDER THE METROPOLIS MANAGEMENT AND BUILDING ACT AMENDMENT ACT.

A CASE of considerable importance to builders was decided at the Surrey Sessions on Tuesday last.

A Camberwell builder, Mr. James Hampton, had laid out for building a plot of ground in the rear of some houses in Chiswell-street, and had erected thereon six blocks of combined dwellings, approached by a street only 16 ft. wide, without having first obtained the approval of the Metropolitan Board of Works. The Vestry of Camberwell complained to the Board, who thereupon directed proceedings to be taken for an infringement of the 8th section of the Metropolis Management and Building Act Amendment Act, 1882, 45 Victoria, ch. 14, which requires that where it is intended by any person to lay out any road, passage, or way for building, as a street for foot traffic only, such person shall give notice to the Board of his intention, and the Board may, on the receipt of such, approve of the formation of such street, either with or without conditions, or may decline to approve of the same, and in the event of the road not being approved, it cannot be lawfully formed.

The defendant in this case, on proceedings being commenced, placed gates at the entrance to the street leading to the houses built by him, and contended that the public not having the right of access to the street it was not subject to the provisions of the Act. The case was heard before Mr. Chance at the Lambeth Police Court on the 29th of May last, when the defendant was represented by counsel. After a lengthened discussion the magistrate convicted the defendant, and imposed a penalty of 20s., and costs, the maximum fine being 40s.

The defendant appealed to Quarter Sessions against the conviction, and the case was again argued on Tuesday last, the 8th inst. Mr. Horace Avory, instructed by Mr. Thos. Burton, appearing for the Metropolitan Board of Works, the respondents, in support of the conviction; the appellant being represented by Mr. Besley and Mr. Ernest Baggalay.

After hearing the evidence the magistrates dismissed the appeal, with costs, subject to a case being stated for the opinion of the Superior Court (which will probably be the Court of Queen's Bench) as to whether the street in question is "a road, passage, or way" under the meaning of the 8th section of the Metropolis Management and Building Act Amendment Act, 1882.

The Reform Club, Liverpool.—The Liverpool Reform Club, which has for some weeks been closed for repairs and redecoration, has been again opened for the use of the members. The work has been done from the designs of Mr. Edmund Kirby, architect, and under his direction. Messrs. Wannop & Son, of Renshaw-street, have done the painting and decoration, and the panelled dado to the dining-room is the work of Messrs. Norbury, Upton, & Patterson, all of Liverpool.

DISSENTING CHURCH-BUILDING NEWS.

Hoylake.—The foundation-stone of a new Congregational Church at Hoylake was laid a few days ago. The site of the new church is at the corner of Station-road and the road to West Kirby. It will not only afford space for the present building, but for a much larger church at some future date, when the edifice now to be erected will be used as a lecture-hall and class-room. The present building will be constructed of brickwork and covered with Welsh slates. Messrs. Smith, builders, of Hoylake, are the sole contractors; and Messrs. W. & J. Hay, of Liverpool, are the architects, from whose designs and under whose supervision the work will be carried out. The cost of the building will be about 1,650*l.*

North Shields.—The Free Methodist Church, North Shields, which was designed by the late John Green, of Newcastle, something like forty years ago, and is in the Italian style of architecture, is about to undergo considerable alterations and improvements, including the introduction of an ornamental pulpit-platform in place of the present pulpit, together with a re-arrangement of the galleries. The church is to be newly painted and decorated throughout. The committee have engaged Mr. J. J. Lish, architect, Newcastle-upon-Tyne, to carry out the works.

Newcastle-on-Tyne.—The design of Messrs. S. Oswald & Son, of Newcastle, has been selected in the limited competition for a new Wesleyan Chapel to be erected at Heaton. The chapel will seat 900 to 1,000 persons; and adjoining it there will be a lecture-hall for 350, besides five class-rooms and vestries. The style adopted is Early English.

The Student's Column.

HINTS FOR THE STUDY OF THE HISTORY OF ARCHITECTURE.—II.

AFTER examining the books and examples referred to last week on the subject of Native Indian Architecture, and postponing, for the present, the consideration of Indian Saracenic Architecture, the student will do well to learn something of the architecture of two other distant parts of the globe, namely, of Mexico in one direction, and of China and Japan in another direction.

China is treated of in Fergusson's Handbook, at page 133, and in his History, in vol. ii., at page 733; and he remarks that the Chinese differ from all European nations, not only in the objects they propose to attain by their arts and in the forms in which they seek to embody their conceptions, but also in the processes by which they carry them out. Their largest works belong rather to engineering than to architecture, as evidenced by their bridges and embankments, and, last but not least, by their Great Wall, said to be about 1,400 miles long and over 20 ft. thick.

With regard to their more architectural works, Rosengarten, page 54, says that Indian art made its entrance into China with the worship of Buddha, and he points out the use of *bracket* construction in place of a capital for the support of the architrave, owing probably to the use of wood, added to the cravings of a restless fancy. They were not satisfied with ordinary straight lines, but curved their roofs about, especially at the eaves and at the feet of the hips, in a distracting manner. Such treatment, when sobered by the effect of repetition in their many-storied pagodas, is not unpleasing. (A pagoda may be seen at Kew Gardens.) In their gateways, a similarity to the construction in the Sanchi Tope, mentioned last week, is pointed out by Fergusson, with the exception that the ends curl upwards instead of downwards.

Some idea of Chinese Domestic Architecture may be gathered from the wonderful models of houses, with their surrounding pleasure-grounds, at the South Kensington Museum, and no doubt their minute accuracy would admit of their being enlarged without much loss of correctness. The frequent use of the *fret* should be noticed in Chinese art.

The adjoining country of Japan possesses some interest for us now that we have so many specimens of its wonderful art in our midst, but until recently we have not had much information about its architecture. This want has now been admirably supplied in Dr. Dresser's "Japan," illustrated with many views of buildings, in addition to drawings of the smaller objects with which we are now familiar. On p. 102 is represented the old wooden building in Nara, where the Mikado's treasures have been preserved for 1,200 years. The roof has been restored, but the body is probably the oldest wooden building known. Here the eaves and hips are straight. The whole building is raised on posts clear of the ground, which may account for the preservation of the wood for this astonishing number of years. Although many instances are given of roofs with a hollow curve from ridge to eaves, there is not much of that curling up of the hips so common in Chinese architecture. At the same time, most elaborate bracketing is used. The treatment of columns and the general proportions of buildings are quite different from anything that we are accustomed to think correct.

On page 148 will be found an interesting example of a tie-beam roof, the beam being used, as in many of our English examples, to steady the walls and to support the roof posts rather than to hold together the feet of the principal as in a truss.

There is given on page 201 a pagoda at Nikko, which is much more cumbrous than the Chinese examples, and also much less curved up at the hips of each tier of its roof. Both in this view and one of the end of a wall, on page 113, should be noticed the jointing of the masonry at the angles of such walls. These are tilted up, but probably for a very different reason from that in the case of the roofs, namely, for preventing the quoin stones from getting loose. This should be borne in mind when Egyptian walls come under consideration, though there was probably no connexion between the two countries.

The Temples at Osaka, illustrated on page 140, bear a stronger resemblance than do the Chinese gateways to the before-mentioned gateways of the Sanchi Tope; the wooden construction is further emphasised by the keys driven through the posts to tighten the cross beams, the upper ones of which are curved upwards throughout their whole length, and the under ones straight.

A journey across the Pacific to Central America introduces us to styles of architecture that are yet further removed than any of the above-named from the *sequent* styles. Here we come to the architecture of Mexico and Peru, which offer ample subject for study and food for thought, and for this reason, that they bear such a tempting *resemblance* to the styles of other countries that it is difficult to believe that there has been no exercise of influence between one and the other; but after enumerating the various theories by which Mexican architecture has been ascribed to the influence of Egyptians, Babylonians, Moguls, and,—at great length by Lord Kingsbrough,—to Jews, Fergusson, page 147, concludes that, on the whole, we may safely exclude all such considerations, and treat of the architecture of Central America as complete in itself and unconnected with any known style.

The best books in the library of our Institute to study on this subject,—though not found in the catalogue under the title of "Mexico,"—are by J. Stephens, and beautifully illustrated by F. Catherwood. They are "Incidents of Travel in Central America, Chiapas, and Yucatan," 2 vols. 8vo., New York, 1841; and "Incidents of Travel in Yucatan," also 2 vols. 8vo., New York, and published two years later, in 1843.

The peculiarity of the Mexican temples consists in their being built on the top of substantial pyramids, and in being of very massive construction with slanting roofs, constructed with oversailing corners of stone. Some light is thrown upon the necessity for this method of construction by the description of an earthquake which the author experienced, and which are said to be of frequent occurrence. In many of the temples the external walls are divided horizontally, the lower portion being essentially massive stonework and the upper part also in stone, but copied from wooden construction; indeed wooden lintels are actually found in some buildings, and the fact of their not having yet utterly decayed, in spite of an unpropitious climate and neglect (as compared with the Japanese example), points to the possibly modern date of these structures.

Fergusson's chronological table ranges over a short period, from the arrival of the Toltecs in 648 A.D. to the arrival of the conquering

Spaniards in 1519, during which this curious out-of-the-way style attained a very high degree of artistic merit. In support of this statement, a visit should be paid to the collection of sculpture, &c., formerly at Mr. Franks's, in Victoria-street, and now at the British Museum. A type of head will be found, showing a technical knowledge of modelling and a grasp of character very much in advance of most antique sculpture,—excepting, of course, that of Egypt, Greece, and Rome.

There are a great many stone idols carved on upright monoliths in which so much space is allotted to the head-dress above the head, that the face itself comes about a third of the way down the stone; the surmounting head-dress consisting of a conglomeration of confused ornament. In vol. ii., however, of Stephens's earlier book, facing p. 349, an idol or statue is represented in which this head-dress is distilled, so to speak, into a grand and simple form that is wonderfully suggestive of the colossal Osiride figures in Egypt.

The frequent use of hieroglyphics covering a great portion of the wall-space supplies another point of resemblance to Egyptian art; but both facts are probably mere coincidences, showing how different people may arrive at similar results.

There is another feature which can hardly be anything but a coincidence, and that is a trefoil-headed opening not unlike those that are fouud in Gothic work! An example of this will be found facing p. 344 in the volume last mentioned.

The use of the fret as an ornament has probably never been carried to such gigantic proportions as in Mexican work. It has been noticed above in speaking of the Chinese, and would there seem to have been suggested by the rectangular lattice framing of their carpentry and joinery. In Mexico, on the contrary, the first indications of it may, perhaps, be found in the system of making some of the facing stones to project beyond the rest, which produces a number of shadows in irregular directions,—now along the wall, now down, now back again twice as far, now up again, and so on.

As regards the surface sculpture generally, as applied to buildings, it is of the class best described as "bogey"; but the broad pilasters which separate the openings leading into the temples are sometimes ornamented with bas-reliefs of gods or priests, executed with extreme delicacy and refinement. These priests are represented with flattened foreheads and long noses of the Aztec type, and do not differ much from each other; whereas the other heads, carved about in various positions, have the appearance of individual portraits, and the element of caricature is conspicuous.

The almost neighbouring country of Peru is a degree more puzzling than Mexico, so far as regards the origin of its architectural style; for this does not even bear any resemblance to that of its neighbour: on the contrary, whereas the Mexican style revels in sculptured decoration, the Peruvian buildings are austerely severe, and are examples of masonry rather than of architecture.

Fergusson, on page 154, attributes a very short existence to the style, namely, from the time of a godlike man, known as Manco Capac, in the thirteenth century of our era, to the conquest of the country by Pizarro in 1534, during which short time he notices great progress to have been made in the art or science of masonry. Curiously enough, this Peruvian work, which can hardly have had any connexion with that of Europe or Asia, presents two features that are characteristic of the Pelasgi and (perhaps we should say, or) the Etruscans, of whom more will be said in the proper place. But after all, this is only one of the proofs that architecture is primarily a matter of construction, for both these people had to construct with the same kind of materials, huge stones of irregular shape forming the masonry known as Cyclopean (or such as might have been put together by the fabulous one-eyed giants known as Cyclopes), which masonry led to another point of similarity, namely, the openings in such walls narrowing upwards, so as to reduce the work of the stone lintel. Even after their skill in masonry had improved, the sloping form of the openings survived, and was employed in buildings of the most refined construction, and the result is a most striking resemblance to the European style known as Etruscan.

A more curious coincidence is pointed out by Fergusson in describing the walls or fortifications enclosing Cuzco, the ancient capital of the kingdom; for here we find a series of walls, one behind another, arranged in the form adopted by modern military engineers to withstand the assault of firearms, and it is extremely improbable that the use of gunpowder was known to the builders of the walls of Cuzco.

It is possible that other hitherto unknown countries may be discovered, exhibiting recognisable styles of architecture, either detached from or linked on to the chain which we have next to consider, and before taking leave of those already mentioned, attention should be drawn to the ingenious manner in which these ruins have been restored and re-inhabited by the rich fancy of Viollet-le-Duc, in his work on the "Habitations of Man in all Ages."

Ethnology is no mean factor in the study of architecture, and, even if the same climate and the same materials be given, a distinct impress will be added by the temperament of those who build.

We will now take leave of the fringe of the web (to use the simile adopted last week), and endeavour to grasp the beginnings of those threads which can still be traced in architecture of our own day.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

June 27.—9,468, J. Brooks, West Bromwich, Door-knobs, &c.—9,479, A. Shepherd, Birmingham, Dwarf Window-blinds.—9,514, J. F. Spong, London, Blinds.

June 28.—9,522, S. Hirschberg, Berlin, and T. Bath, Berlin, Germany, Combined Bedstead, Wardrobe, Washing Utensil, Support, and Drawers.—9,546, E. G. Brewer, London, Cooling and Ventilating Apparatus. Com. by L. Koppel, Dresden.—9,552, G. H. Jennings, S. Jennings, and J. Morley, London, Controlling, Regulating, &c., the Supply of Water for Sanitary purposes.—9,553, G. H. Jennings and S. Jennings, London, Controlling, Regulating, &c., the Supply of Water for Sanitary purposes.

June 30.—9,568, C. Callow, Burnley, Suspending and Adjusting Venetian Blinds.—9,573, J. C. Baker, London, Ventilating Buildings, &c.

July 1.—9,598, J. Adams and J. Telford, Liverpool, Preventing Down-draught in Chimney-tops and Ventilators.—9,604, J. H. Gibson and W. Glazier, Liverpool, Curtain-stretching Apparatus.—9,647, H. H. Lake, London, Ventilating Cap or Cowl. Com. by H. L. Day, Minneapolis, U.S.A.

July 2.—9,657, J. J. Green, Halifax, Chimney-pots.—9,667, J. C. Snelling, West Croydon, Bricks.—9,670, W. W. Fyfe, Aberdeen, Ventilators.—9,671, J. Linden, London, Blind-holder or Stretcher.—9,685, G. L. Pearson, London, Appliances for Detecting the efforts of burglars, &c., to enter premises.—9,699, S. Frankenberg, London, Damp-proof Compound, &c.

July 3.—9,705, W. P. Thompson, Liverpool, Manufacture of Panels, Frames, &c., for Decorative purposes. Com. by W. Saul, Jersey, U.S.A.—9,740, L. R. Marsden, Darwen, Apparatus for Stretching Curtains, &c.

SPECIFICATIONS ACCEPTED.†

July 1.—976, E. Lloyd, London, Kitcheners.—1,690, J. D. Mackenzie, London, Sash-bars or Astragals for Roof-lights and Window-sashes.—2,653, C. H. Riley, Huddersfield, Chimney-tops.—7,118, E. P. Gibbon, Dublin, Channel Roofing and Awnings.—8,091, F. Cuntz, Karlsbad, Automatic Flushing Tank.—8,327, W. Smith, Barnard Castle, Ovens.

July 4.—6,403, C. D. Abel, London, Converting Liquids into Spray for Ventilating Purposes. Com. by E. Oehlmann, Berlin.—7,507, H. Trott, London, Water-waste Preventer and after-push combined, for Water-closets.

ABRIDGMENTS OF SPECIFICATIONS

Published during the week ending July 5, 1884.

5,333, W. P. Kelly, Mount Brandon, Retaining and Releasing Window-blind Cords, &c. (Nov. 12, '83, 6d.)

A box is fitted in which are two wooden blocks, one of which is wedge-shaped, while the other has a corresponding recess. The cords pass through the box and between the blocks, being jammed there by a spring behind one of them.

5,388, H. A. Goodall, London, Blinds for Windows. (Nov. 15, '83, 6d.)

These are made of slate, of wood crossed on each other and pivotted at their crossings, and to keep them stiffly in position a longitudinally grooved rail, extending from side to side, is placed above and another below the slats, which rails slide in the grooves of similar vertical rails the whole height of the window.

5,391, J. Warhurst, London, Excluding the Entrance of Draughts and Rain, &c., to Rooms. (Nov. 15, '83, 6d.)

This is an improvement on Patent No. 1,690, of 1869, in fitting the strip of wood to a roller, on which is a quick pitched screw-thread fitting into a nut projecting beyond the edge of the door. A coiled spring surrounds this roller to keep the strip up in the door when the same is open, but when the door is shut the nut presses against a plate on the door-post, and the roller is revolved thereby, and the strip is pressed down on the floor.

5,467, M. Mackay, London, Plastic compounds. (Nov. 20, '83, 4d.)

This compound for ornamental architectural use, &c., is made of lac, gum sandarac, rosin, ivory black, or other carbon and asbestos.

5,576, T. H. Fielding and A. U. Jonsen, Sydney, Protecting Buildings, &c., from Heat. (Nov. 29, '83, 2d.)

Metallic foil or leaf is applied to the outer surface of the building, &c., to be protected. (*Pro. Pro.*)

5,585, W. J. Penny, London, Window-sashes and Sash-frames. (Nov. 30, '83, 6d.)

The sashes slide in between the beads as usual, but, to enable the sashes to be turned to clean, &c., the outsides thereof, either the beads are divided into two parts longitudinally, which parts are hinged together to allow the projecting part to be turned out of the way of the sash, or the side stiles of the sashes are similarly divided just clear of the beads, the two parts being hinged together on one side, and on the other being secured by bolts, &c., so that when these are disconnected the window can turn like a door.

5,596, G. Greig, Harvieston, Ventilating Apparatus. (Dec. 1, '83, 2d.)

The fresh air is introduced into the room in the centre of the ceiling, and immediately under the mouth of this inlet is a circular concave deflecting plate to spread the current of air all over the room. (*Pro. Pro.*)

5,600, G. F. Redfern, London, Substitute for Stone, Bricks, &c. Com. by J. Stickle, Denver, U.S.A. (Dec. 1, '83, 2d.)

Moulds of the required pattern are filled with pieces of scoria, and then molten scoria is poured in to bind them together and shape the block. (*Pro. Pro.*)

5,824, A. M. Clark, London, Metallic Plastering surfaces. Com. by J. Stanley, New York, U.S.A. (Dec. 20, '83, 6d.)

Wire cloth is used as a plastering surface, and it is also corrugated or ribbed to stiffen it.

* Compiled by Hart & Co., Patent Agents, 186, Fleet-street.

† Open to public inspection for two months from the dates named.

MEETINGS.

SATURDAY, JULY 12.

International Health Exhibition (Conference of the Royal Institute of British Architects).—At 2 p.m. (1), Mr. George Aitchison, A.R.A., on "The Sanitary Aspect of Internal Fittings and Decoration"; (2). Mr. William White, F.S.A., on "The Hygienic Value of Colour." The discussion to be opened by Mr. T. W. Cutler.—At 4 p.m., Mr. Thomas H. Watson on "The Collection, Storage, Management, and Distribution of Water, for Domestic Purposes, within the House." The Right Hon. A. J. B. Beresford Hope, M.P., Chairman for the day; Professor T. Hayter Lewis, Vice-chairman.

Association of Municipal and Sanitary Engineers.—Meeting at Newcastle. 10.30 a.m., Closing Business. 11 a.m., Visits to various works.

St. Paul's Ecclesiological Society.—Visit to Winchester by 9 a.m. train from Waterloo. The Cathedral and St. Cross will be visited, under the guidance of Mr. Somers Clarke, F.S.A.

Association of Public Sanitary Inspectors.—Visit to Messrs. Doulton's Potteries 10.45 a.m. Subsequently at 1.45 a steamboat will leave Westminster Bridge for the works of Messrs. Johnstone, at Belvedere, Kent.

WEDNESDAY, JULY 16.

National Smoke Abatement Institution.—Meeting to consider the Bill now before the House of Lords to Amend the Smoke Abatement Act. 3 p.m.

Miscellanea.

The "Sir John Gray Reservoir," Dublin. On the 26th ult. the Lord Mayor of Dublin performed the ceremony of turning the water into the new reservoir at Stillorgan, which, in memory of a distinguished citizen, who took a leading part in promoting a perfect system of water-supply for the city, has been named the "Sir John Gray Reservoir." The Lord Mayor stated that the reservoir covered 22¾ acres, and it was capable of holding 88,000,000 gallons; and this, they believed, would meet any possible emergency. He need scarcely inform his fellow-citizens, many of whom he saw present, that the water of the great reservoirs at Stillorgan was collected from a water-shed of 14,000 acres, and that there was impounded in these reservoirs 2,400,000,000 gallons, which it was calculated would last the city and the suburbs 170 days. The greatest possible care was taken to convey the water supply to the city in a pure state. Great trouble was taken in having it filtered. The Waterworks Committee, through the medium of a large accumulation in the reservoir, were enabled to send a constant supply to the city and to the whole of the outlying townships, with the exception of Rathmines. The district which was embraced in the area of supply reached as far south as Bray, and in the north as far as Drumcondra and Glasnevin. Mr. Neville is the engineer.

New Buildings in London-wall and Coleman-street.—A new face is at present being given to a considerable portion of London-wall and Coleman-street by the erection of several new buildings on an extensive site belonging to the Drapers' Company, which has been cleared of the old buildings that until recently stood upon it. The site thus cleared covers an area of upwards of 30,000 ft., or about an acre in extent. Amongst the new buildings now on the point of completion is one in Coleman-street, immediately opposite the Armourers' Hall. It contains four lofty floors, and is faced with Portland stone, freely carved, having fluted piers and pilasters between the windows. The building has also a similar return frontage in London-wall. Mr. George Vickery is the architect, and Mr. Morter the contractor. Immediately adjoining, with its frontage in Coleman-street, is another building, much resembling this in its architectural features. Messrs. W. & F. Croaker, of Great Dover-street, are the contractors. The Coleman-street frontage of these two buildings is upwards of 70 ft. in length. In continuation in London-wall westward is another building forming a block of warehouses, with a frontage of 30 ft. in length, and extending 70 ft. in depth along an intended new street or approach to several sites yet to be built upon. This building, containing four stories above the ground-floor and basement, is faced with red brick and stone dressings, and covers a ground area of about 1,700 ft. Mr. W. E. Brown is the architect, and Mr. R. Conder the contractor. On the west side of the intended new street just referred to, and opposite the last-named building, is another extensive block, having a frontage to the intended new street of about 70 ft. in length, with a return frontage in London-wall upwards of 30 ft. long. It is 60 ft. in height, containing five lofty floors. It is faced with white Suffolk brick, having Portland stone dressings with red brick bands. Mr. Lewis Solomon, of Gray's-inn-square, is the architect, and Messrs. Patman & Fotheringham are the contractors. Beyond the last-named building another block of warehouse premises is approaching completion. They are faced with Portland stone, having polished Shap granite piers at each side of the ground floor. Messrs. Joseph & Pearson are the architects, and Messrs. Patrick & Sons are the contractors. The entire London-wall frontage of these several buildings is about 200 ft. in length. The Drapers' Company announce the sale, on building leases, of thirteen more sites on the estate, covering an aggregate of 20,000 ft., each site containing 1,500 ft.

The Inventors' Institute. — The annual dinner of this Institute took place on the 2nd inst. at the Health Exhibition. Admiral Jasper Selwyn presided, and about eighty gentlemen sat down to dinner. After the usual loyal toasts, the Chairman gave "Success to the International Health Exhibition." Mr. Winter responded. "Inventors and Inventions" was proposed by Mr. Davey, who maintained that the advancement of the interests of inventors meant the advancement of the interests of civilisation itself. Mr. J. Standfield, C.E., in replying, traced the progress of inventions during the last quarter of a century, and referred to the new patent law. Previous to the new Patent Act it had been considered by the world that the English were not inventors but improvers. He had always maintained that the number of patents taken out was controlled by the fees which were demanded for them, and his opinion had been fully borne out by the operation of Mr. Chamberlain's Patent Act which had come into force only this year. There were more patents taken out in England during the first three months of this year than had ever been taken out in England in any year before that. He ventured to predict that the number would continue to steadily increase. Those countries which gave the greatest facilities to inventors gave the greatest facilities to trade and commerce. He referred especially to the immense service rendered not only to his own country but to the interests of civilisation at large by Trevethick. He also spoke of the important inventions of Dudd Dudley, Wedgwood, John Allen, Wm. Lee, and Arkwright.

The Wallace Memorial, Aberdeen.—In regard to this competition, we learn that none of the designs lodged have been accepted in their present form; but revised designs have been invited from the three competitors having for mottoes "Patriot," "Spes," and "Fortiter."

A New Dock at Battersea.—A new dock which has been excavated and built on a large tract of ground adjoining the foundry works of Mr. Allan Ransome, at Battersea, was opened on Wednesday. New flour-mills, which will be an immediate source of profit and commerce for the dock, were also opened at the same time. These mills are fitted with improved machinery by Messrs. Marriage, Neave, & Co., and are intended to compete with the American efforts to absorb the milling trade of this country. The dock entrance is midway between the Albert and old Battersea bridges, and the dock extends from the southern shore of the Thames nearly to the highway between the town and the park, and converts a large area of poor grazing land into very valuable wharf property. The gates are wide enough, and the dock deep enough, not only to take in lighters, but also sailing barges and coasting steamers. Further, the entrance has been dredged to allow the largest vessels coming through the bridges to enter and leave the dock at the top of neap-tides. Its width is over 100 ft. in the inner basin,—sufficient to allow the turning of a steam-tug; and two lines of barges can pass each other in the narrowest part. The dock work has been carried out under the direction of Mr. Edward Woods, C.E., the contractors being Messrs. Cooke, of Battersea.

The New Roof of the Royal Exchange. Since the commencement of April last the workmen of Messrs. Whitford & Co., constructive engineers, of the Royal Ironworks, Limehouse, who are executing the iron work for the new roof over the central area of the Royal Exchange, have been engaged in erecting the roof, which was constructed and fitted together at their works. The works have now been far advanced towards completion, the greater part of the roof being now in position. The iron work of the arched portions at the east and west ends has been fixed, and is now being painted preparatory to glazing. The works in connexion with the central dome of the roof are likewise progressing, the base of the dome having already been fixed, whilst the erection of the arched iron ribs has been commenced. Messrs. Cubitt & Co. are carrying out the alterations which are required in the fabric of the building. The decorations of the roof have been entrusted to Messrs. Jackson & Co., of Rathbone-place, and the whole of the works are expected to be completed in about two months. The roof, which is being constructed from the designs of Mr. C. Barry, will cost about 10,000*l*. We published a large view of this roof in the *Builder* for October 13, 1883.

Putney (New) Bridge.—The foundation-stone of this bridge will be laid at 3 p.m. on Saturday (to-day) by their Royal Highnesses the Prince and Princess of Wales, who will proceed from Marlborough House, *viâ* Knightsbridge and Fulham-road, over Putney-bridge, to the entrance to the new bridge at the northern end of High-street, Putney. They will there enter the works and see models and plans of the bridge in a small pavilion close to the stone to be laid. After laying the stone their Royal Highnesses can, if they are so disposed, proceed for a short distance over the temporary bridge to see the piers in course of construction within the dam. Returning to the entrance where they left their carriage their Royal Highnesses will then drive back by way of Putney High-street, Wandsworth High-street, York-road, through Battersea Park, and over Chelsea Bridge.

The New Railway Bridge at Blackfriars.—Messrs. Lucas & Aird, the contractors for the London, Chatham, and Dover Company's new station and bridge across the Thames at Blackfriars continue to make rapid progress with the works, and on Wednesday the ironwork of the first portion of the Middlesex side arch was placed in position. With the exception of that on the Surrey side, next the land abutment, the masonry of the whole of the four river piers is nearly finished and ready to receive the ironwork, and it is expected that the main portion of all the arches will be in position in about three months from the present time. The works in connexion with the erection of the new station are also considerably advanced.

Decoration of the Dome, St. Paul's Cathedral.—We are informed that the modification of Stevens's design by Mr. Hugh Stannus, which is to be fixed up in the cupola on the south side, opposite to the design by Mr. E. J. Poynter, R.A. (which we illustrated in our last), will be visible in about three weeks' time.

Bourse Buildings, Bucklersbury.—These extensive buildings, at the corner of Bucklersbury and Queen Victoria-street, have just been completed by the erection of an angular block at the rear, faced with white enamelled brick. The Bucklersbury frontage is faced with red brick and Portland stone, the central portion of the elevation having ornamental bay windows, with fluted pilasters. The buildings throughout have been very substantially erected, all the brickwork being laid in Portland cement. Altogether the buildings contain nine floors, including a basement and sub-basement, with ground and six upper floors. There is a lift, on Hart's principle, from the basement to the top of the building. An artesian well has been sunk on the premises, from which the several offices are supplied with water. This well has been sunk to a depth of about 400 ft. below the ground-surface, and bored into the chalk 100 ft. deep. The well was sunk by Messrs. S. F. Baker & Sons. Altogether there are upwards of 200 rooms in the buildings. Mr. J. Whichcord, F.S.A., is the architect, and Messrs. E. Lawrence & Sons the contractors.

Locks and Lock Furniture.—Mr. James Hill, of Queen Victoria-street, has sent us his new illustrated catalogues of his specialities in this line, which have been and are being largely used, not only in private but in public buildings. The catalogues are likely to prove useful for reference. Mr. Hill has just completed a large contract for the Great Eastern Railway Hotel, Liverpool-street, comprising upwards of 600 locks in different suites, and governed by various master-keys, together with his patent door and sash furniture, all of which we understand were selected by the architect, Mr. Charles E. Barry.

Gift of a Public Park to Dundee.—At the meeting of the Law Committee of the Dundee Town Council, on the 25th ult., the clerk read a letter from Messrs. Shiell & Small, solicitors, with a memorandum of the terms in which Sir John Ogilvy's gift to the town of the Fairmuir is to be carried out. It appeared that Sir John, with the consent of his son, Colonel Ogilvy, is to convey to the Town Council and the Police Commission the Fairmuir to be a public park for the inhabitants of Dundee in all time coming, and for the playing of cricket, but subject to the present right of the town to hold the market fairs on the ground.

Social Science Association.—Mr. Clifford Smith, the energetic secretary of the Association, has compiled an index of the subjects and names of the authors of all papers read in the Department of Public Health of the Association since its establishment in the year 1875. It makes a pamphlet of 40 pages, and gives a remarkable idea of what the Association has done on this class of subjects, and of the extent and variety of its labours. The pamphlet forms a useful memorandum "where to turn" for special information in regard to many subjects of interest in connexion with sanitary science.

The Frere Memorial.—At a meeting of the Frere Memorial Committee at Marlborough House on the 7th, the Prince of Wales presiding, it was unanimously resolved that Mr. Brock should be communicated with as to undertaking the work, and a letter was read from Sir J. M'Garel-Hogg stating that the Metropolitan Board of Works would be happy to give a site on the Embankment for the purpose, near the statue of Sir James Outram.

Appointments. — In consequence of the retirement of Mr. George Pownall from active professional practice, the directors of the Law Fire Insurance Society have appointed Mr. George Harry Pownall, of No. 29, Parliament-street, and Mr. Edward Street, of No. 9, Sergeant's Inn, Fleet-street, as their architects and surveyors.

Cemetery, Ryton-upon-Tyne.—The Ryton (parish) Local Board are just completing their new cemetery works, at a cost of near 4,000*l*. Messrs. Salter & Lishman, of Ryton, are the contractors, and the works have been carried out from the designs, and under the superintendence, of Mr. J. J. Lish, architect, Newcastle-upon-Tyne.

Kensington.—The foundation-stone of St. Cuthbert's Church, South Kensington, was laid on the 2nd inst. by the Earl Beauchamp. Mr. H. Roumieu Gough is the architect, and Messrs. S. Belham & Co. are the contractors. A view of the church, which is one of considerable importance, is exhibited at the Royal Academy this year.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered	Page.
New Church, Liverpool	Trustees	Not stated	August 11th	ii.
Dairy Homestead	British Dairy Farmers' Association	Not stated.	August 25th.	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Enlargement of Christ Church, Cliftn	.....	W. Bassett Smith	July 14th	ii.
Memel Deals	Norwich Corporation	F. P. Marshall, C.E.	July 15th	xxvi.
Whitewashing, &c. Exeter Barracks	War Department	*Official*	July 16th	ii.
Broken Granite	Mile End Vestry	J. M. Knight	do.	ii.
Repairing St. Mary's Church, Bryanston-square	Vestry of St. Marylebone	*Official*	July 17th	ii.
Cleaning and Painting Stations	Midland Railway Co.	A. A. Langley, C.E.	do.	ii.
Alterations, &c. to Workhouse	Grdians of Poplar Un	George Morris	July 18th	xxvi.
High Bridge, Stower, nr Gillingham	County Authority	W. J. Fletcher	do.	xxvi.
Retort House, Brentwood	Gas Company	Jabez Church	July 19th	xxvi.
Fittings, Plymouth New Post-Office	Com. of H. M. Works	*Official*	do.	ii.
Stone Kerbing	Mortlake Highwy Bd	J. Medworth	July 20th	ii.
Construction of Road	E. A. Robinson	.....	July 21st	ii.
Alterations, &c. to Offices	Hornsey Local Board	T. de Courcy Meade, C.E.	do.	xxvi.
Blinds, Croydon Infirmary	Guardians	.....	do.	ii.
Boundary-walling, &c. Crydn Infrmy	do.	Franklin & Andrews	do.	ii.
Making-up Street	Wands. Dis. B. of W.	*Official*	July 22nd	ii.
Painting, &c. Offices, also additions	Guardians St. Matt. Bethnal Green	J. & W. Stone	do.	xxvi.
Construction of Roads	Rock Frhld Land Soc.	.....	July 23rd	ii.
Iron Railings and Gates	Paddington Vestry	*Official*	do.	ii.
Granite, Flints, &c.	Hendon R. S. A.	*Official*	do.	xxvi.
Foundry Bridge	Norwich Corporation	F. P. Marshall, C.E.	July 28th	xxvi.
School and Teacher's Residence, Crumlin, near Monmouthshire	Mynyddislwyn School Board	E. A. Lansdowne	July 29th	xxvi.
Canal Basin, &c. Stourport	Great Westrn Ry. Co.	*Official*	do.	ii.
Foundations, &c. of Bridge	Hull Corporation	J. Fox Sharp	July 31st	ii.
Town-hall, Wellington, Somerset	Directors	E. T. Howard	August 2nd	ii.
School Buildings and Master's House Newbury	Governors	J. P. Power	August 4th	xxvi.
Granite	Reigate Town Council	*Official*	August 5th	xxvi.
School Buildings, Stoughton	Guildford School Bd.	S. Welman	Not stated	xxvi.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Applications to be in.	Salary.	Page.
Clerk of Works for Sewage Works	Kettering Local Board	July 17th	Not stated	xvi.
Waterworks Engineer	Alnwick, &c. Local Brd.	July 19th	do.	xvi.
Surveyor and Inspector of Nuisances	Haverhill Urban S. A.	July 21st	100*l.*	xvi.
County or District Surveyors in Ireland	Civil Service Commis.	August 1st	Not stated	xv.
Assistant Superintendent of Furniture	Civil Service Commis.	August 2nd	do.	xv.

TENDERS.

For the erection of artisans' dwellings, in Cartwright-street, Royal Mint-street, Minories. Messrs. Davis & Emanuel, 2, Finsbury-circus, City, architects. Quantities supplied by Mr. H. P. Foster, 5, John-street, Adelphi:—

F. & F. J. Wood	£19,483 0 0
T. Boyce	16,058 0 0
Wall Bros.	15,990 0 0
J. Mowlem & Co.	15,665 0 0
W. Shurmur	15,480 0 0
G. Shaw	15,180 0 0
G. S. S. Williams & Son	15,100 0 0
Colls & Son	14,910 0 0
M. Gentry	14,500 0 0
Harris & Wardrop	14,370 0 0
E. Lawrance & Son	14,280 0 0
J. Grover	13,970 0 0
S. J. Jerrard	13,793 0 0

For building new schools and offices, in Priory-grove, South Lambeth, for the London School Board. Mr. E. R. Robson, architect. Quantities by Mr. C. W. Brooks:—

Goodman	£13,333 0 0
Shurmur	13,221 0 0
Lathey Bros.	12,928 0 0
Hart	12,873 0 0
Priestley & Gurney	12,816 0 0
Perry & Co.	12,808 0 0
Scrivener & Co.	12,764 0 0
Turtle & Co.	12,763 0 0
Wall Bros.	12,723 0 0
Jackson & Todd	12,715 0 0
Patman & Co.	12,643 0 0
Wm. Oldrey	12,600 0 0
Grover	12,490 0 0
Bangs & Co.	12,358 0 0
Kirk & Randall	12,328 0 0
Shepherd	12,326 0 6
Hobson	12,274 0 0
Stimpson & Co.	12,240 0 0
C. Wall	12,195 0 0
Hunt	12,141 0 0
Downs	12,090 0 0
Jerrard	13,289 0 0
Holloway	12,040 0 0
Tongue	11,675 0 0

For building new schools and offices, at Kilburn-lane, for the London School Board. Mr. E. R. Robson, architect. Quantities by Mr. W. H. Barber:—

Perry	£18,990 0 0
Scrivener	18,787 0 0
Downs	18,317 0 0
Lathey	18,295 0 0
Patman	18,263 0 0
Bangs & Co.	18,200 0 0
Kirk & Randall	18,155 0 0
Shurmur	18,023 0 0
Wm. Oldrey	18,000 0 0
Hart	17,885 0 0
C. Wall	17,832 0 0
Jerrard	17,749 0 0
Priestley & Gurney	17,693 0 0
Grover	17,539 0 0
Wall Bros.	17,397 0 0

For cleaning and painting Park-walk School, Chelsea, for the London School Board:—

Kearley	£459 0 0
Lathey	453 0 0
Wm. Oldrey	429 0 0
Stimpson & Co.	382 0 0
Smith & Son	374 0 0

For cleaning and painting North End-road School, for the London School Board:—

Kearley	£477 0 0
Homett	467 0 0
Wm. Oldrey	445 0 0
Knight	443 0 0
Stimpson	389 0 0
Smith & Son	378 0 0

Accepted for building residence, at Broadstone, Dartmouth, for Mr. D. Manning. Mr. E. H. Back, architect. Quantities by architect:—

Williams	£435 0 0
Voisey	410 0 0

Accepted for building two houses and shops, at Lower-street, Dartmouth, for Mr. Hamlyn. Mr. E. H. Back, architect, Dartmouth. Quantities by architect:—

Williams	£695 0 0

Accepted for alterations to four tenements, at Kingswear, Devon, for Mr. H. Parry. Mr. E. H. Back, architect:—

Winsor	£125 0 0

For the erection of schools, in Bolt-street, Newport, Mon., to accommodate 620 boys, girls, and infants, for the Newport United District School Board. Mr. E. A. Lansdowne, architect. Quantities supplied:—

C. Miles, Newport	£3,500 0 0
J. Burgoyne, Pontypool	3,375 0 0
Moulton & Bromscombe, Newport	3,349 0 0
W. Jones & Son, Newport	3,347 0 0
H. Parfitt, Pontnewydd	3,295 0 0
W. Blackburne, Newport	3,287 0 0
W. Price, Newport (accepted)	3,195 0 0

For storm-water drainage works, Great Malvern. Mr. J. E. Palmer, engineer:—

Small & Son, West Bromwich	£3,390 0 0
Inwood, Malvern	3,186 0 0
Welsh, Hereford	3,168 0 0
Jevons, Dudley	2,853 1 6
Everd, Malvern	2,803 0 0
Biggs, Birmingham	2,663 0 0
Osborn, Malvern	2,655 0 0
Law, Kidderminster	2,647 5 3
Hughes, Dudley	2,506 15 4
Broad, Malvern	2,459 0 0

[Engineer's estimate, £2,660.]

For the erection of a residence in the Church-road, Shortlands, Kent. Mr. William H. Duffield, architect, Cedars-road, Beckenham, Kent:—

D. D. & A. Brown, Camberwell	£2,195 0 0
J. Barnett, Shortlands	1,790 0 0
Leech Bros., Shortlands	1,764 0 0
E. R. Palmer, Beckenham	1,666 0 0
H. Balding, Bromley (accepted)	1,591 0 0

For alterations, &c., at the Roebuck Tavern, Kennington-cross, for Mr. F. Doré. Mr. H. I. Newton, architect, 17, Queen Anne's-gate:—

Burman & Sons	£497 0 0
Schlater	455 0 0
Jennings & Sons	380 7 0
Cook	358 0 0
Crabtree	345 0 0
Walker (accepted)	319 0 0
Pewterers' Work.	
Davidson (accepted)	39 10 0

For the erection of new Board School, for the Clee-with-Weelsby School Board, Great Grimsby, for 500 children. E. W. Farebrother, architect, Grimsby:—

Riggall & Hewins (accepted)	£3,515 15 0

For the erection of new house, Town Hall-street, Grimsby, for Mr. Calvin Shankster. Mr. E. W. Farebrother, architect, Grimsby:—

H. Doughty	£649 5 0
T. Simisson	606 0 0
G. Smith	580 0 0
J. & R. G. Guy	573 0 0
Riggall & Hewins (accepted)	563 0 0

For supplying and fixing wrought-iron unclimbable fencing, with posts and gates, at the Boscombe Chine-gardens, Bournemouth, for the Bournemouth Commissioners. Mr. G. R. Andrews, surveyor. Quantities supplied:—

Birtwistle & Co., Burnley	£635 6 0
Faulkener & Sons, Walton-on-Thames	528 18 8
F. Spreadbury, Bournemouth	485 12 0
E. Howell, Poole	447 8 0
H. S. Crump, Gloucester	410 16 0
H. Street, Boscombe	410 15 4
Hill & Smith, Brierly Hill	409 0 0
Wood & Co., Bournemouth	406 16 0
Bacon & Co., Bournemouth	403 0 8
C. W. Broocke, Bournemouth	402 17 0
H. Kitcher, Bournemouth	372 5 8
Rowell & Co., London	360 12 0
W. Haydon, Bournemouth (accepted)	356 8 0

For the erection and completion of a factory, at No. 102, Bermondsey-street, for Messrs. J. E. & W. Christy & Co. Mr. John Gale, architect:—

Brass	£4,813 0 0
Greenwood	4,230 0 0
Colls & Sons	4,225 0 0
Rider	4,200 0 0
Shepherd	4,189 0 0
Boyce	4,141 0 0
Green	4,072 0 0
Higgs & Hill	3,940 0 0
F. Higgs	3,840 0 0
J. O. Richardson	3,759 0 0

For building new warehouse, on the site of No. 81, Bunhill-row, St. Luke's, E.C., for Mr. Richard Scully. Mr. John Groom, architect:—

Mattock Bros.	£1,093 0 0
J. O. Richardson	1,073 0 0
Harris	997 0 0
Harper	980 0 0
Sabey	978 0 0

For the erection of a sanitary hospital, &c., on the Freemantle Estate, Boscombe, Bournemouth, for the Bournemouth Commissioners. Mr. G. R. Andrews, architect and Town surveyor. Quantities not supplied:—

G. James, Bournemouth	£3,250 0 0
H. Blachford, Bournemouth	2,925 0 9
J. A. Nethercoate, Bournemouth	2,900 0 0
R. Pike, Bournemouth	2,800 0 0
H. I. Sanders, Southampton	2,798 0 0
Lawson & Donkin, Bournemouth	2,798 0 0
C. A. D. George, Bournemouth	3,700 0 0
W. Stanley, Bournemouth	2,650 0 0
A. H. Stroud,* Bournemouth	2,260 15 0

* Accepted.

For constructing a 12-inch intercepting sewer, in the Commercial-road, Bournemouth, for the Bournemouth Commissioners. Mr. G. R. Andrews, surveyor. Quantities supplied:—

G. James, Bournemouth	£798 19 0
Whetham, Weymouth	686 14 0
Saunders & White, Bournemouth	581 10 0
H. J. Sanders,* Southampton	518 0 0

* Accepted.

For constructing a system of sewerage in the Valley of the Bourne, for the Bournemouth Commissioners. Mr. G. R. Andrews, surveyor. Quantities supplied:—

G. James, Bournemouth	£863 3 0
Whetham, Weymouth	793 19 0
H. J. Sanders, Southampton	635 0 0
Saunders & White,* Bournemouth	600 19 0

* Accepted.

For detached villa, for Mr. G. R. Andrews, Christchurch-road, Bournemouth. Mr. G. R. Andrews, architect. Quantities supplied:—

G. James, Bournemouth	£1,050 0 0
Lawson & Donkin, Bournemouth	1,026 0 0
Hoare Bros. and Walden, Bournemouth	1,025 0 0
C. A. D. George, Bournemouth	1,000 0 0
A. H. Stroud, Bournemouth	998 0 0
G. Weaver, Bournemouth	926 5 0
J. McWilliam, Bournemouth	920 0 0
R. Pike, Bournemouth (accepted)	905 0 0
Concrete Foundations, Drains, and Road Making.	
Saunders & White (accepted)	£103 5 6

For alterations and additions to premises, 65, Crockherbtown, Cardiff. Mr. Edward H. Bruton, A.I.B.A., architect:—

		Time.
Davies	£1,130	3 months
Shepherd	1,112	13 weeks
Shepton	1,105	—
Lock	1,079	10 weeks
Jones Bros. (accepted)	1,049	11 weeks
Gough	1,031	4 months

[Smallbridge, Short, and Chivers too late.]

For alterations, &c., at the Duke of Gloster public-house, Seabright-street, Hackney-road. Mr. B. J. Capell, architect:—

G. S. Pritchard	£400	0	0
J. Anley	377	0	0
W. Shurmur	369	0	0
R. Marr	365	0	0
Kevan	319	0	0
Pryor (accepted)	290	0	0

For repairs, painting, &c., at Duncombe-road, Holloway, for the London School Board. Mr. E. R. Robson, architect:—

Kirby & Chase	£471	0	0
T. McCormack	448	10	0
W. Goodman	425	0	0
Knight & Walden	423	0	0
W. Shurmur	423	0	0
T. H. Smith & Son	377	0	0
J. Grover	365	0	0

For alterations, &c., at the Anchor and Hope public-house, Charlotte-street, Blackfriars. Mr. F. W. Willis, architect:—

J. A. Taylor	£595	0	0
Wilkinson	586	0	0
Jackson & Todd	578	0	0
W. Shurmur (accepted)	567	0	0

For repairs and painting at the Dyers' Hall, Dowgate-hill, for the Worshipful Company of Dyers. Mr. J. Hatchard Smith, architect:—

Ashby & Horner	£475	0	0
W. Shurmur	450	0	0
Kinninmont	437	0	0

For the erection of ten cottages, at High Barnet, for Mr. Bruce Johnson. Mr. Walter Graves, architect:—

Martin Taylor (accepted)	£2,460	0	0

For Stratford-upon-Avon Sewage Works. Mr. E. Pritchard, C.E., engineer, Westminster. Contract No. 3, for construction of pumping-station, pipe-laying, and other works:—

Pervins & Sons, Dudley	£5,689	15	11
G. F. Smith, Milverton	5,600	0	0
B. Cooke & Co., London	5,500	0	0
Holme & King, Wigan	4,777	0	0
Roberts, Stratford-on-Avon	4,500	0	0
Hilton & Sons, Birmingham	4,430	0	0
Currall & Lewis, Birmingham	4,318	0	0
Cunliffe Leigh, Lancashire	4,067	0	0
George Law,* Sutton Coldfield	4,017	0	0

* Accepted.

For alterations and additions to stabling, and erection of coach-house, &c., at Chessingham House, Denmark-road, Carshalton, Surrey, for Mr. J. H. Davis. Mr. Thos. Lockwood Heward, architect:—

Hazell, Beddington Corner	£193	0	0
Sanders, New Malden	187	0	0
Stewart, Wallington	178	0	0
Evans, Carshalton	169	0	0
Smith & Bence, London	165	0	0
Howe & White, Wallington	165	0	0
Clarke, Croydon	153	0	0
Aldous, Carshalton (accepted)	125	16	0

[Architect's estimate, £160.]

For new warehouse, in Suffolk-lane, City, for Sir Francis Wyatt Truscott. Mr. Wimble, architect:—

Brass (accepted)	£8,500	0	0

For the erection of oven and bakehouse, and other works, at the Workhouse, West-end, Southampton, for the Guardians of South Stoneham Union. Mr. W. H. Mitchell, architect, Southampton:—

John Witt, Bitterne	£168	8	0
Mears, Freemantle	165	0	0
D. Haines,* West-end, Southampton	160	0	0

* Accepted.

For building a new warehouse, Sunderland, for Mr. Wm. Burns. Mr. J. E. Prosser, architect and surveyor. Quantities supplied:—

D. & J. Ranken, Sunderland	£375	0	0
M. Howarth, Sunderland	349	18	0
J. Huntley, Sunderland	339	0	0
R. M. Fairclough,* Sunderland	315	10	0

* Accepted.

For painting and repairs to the Paragon-buildings, Walworth, for the Fishmonger's Company. Mr. Thos. Chatfeild Clark, architect:—

Phipps & Bisiker	£216	10	0
Heeps	197	0	0
Holliday & Greenwood	167	0	0
Harman (accepted)	163	10	0

For road and sewer at Paul's Cray. Mr. J. Cowell, surveyor:—

Taylor & Son	£545	0	0
Capon	502	0	0
Beadle Bros.	488	0	0
Trueman	375	0	0

For proposed additions to the Home of the Marist Fathers, Paignton, Devon. Mr. George Soudon Bridgman, architect, Torquay:—

Mountstephen, Torquay	£1,737	10	0
King & Son, Paignton	1,649	0	0
Goss, Torquay	1,610	0	0
Lamacraft, Dawlish	1,550	0	0
Bovey, Torquay	1,490	0	0
Foaden, Ashburton	1,481	17	6
Bridgman, Paignton	1,472	10	0
H. Webber, Paignton *	1,437	0	0

* Accepted subject to minor alterations.

For New School accommodation for the Congregational Building Committee, Dawlish. Mr. George Soudon Bridgman, of Torquay, Architect:—

Mountstephen, Torquay	£502	10	0
Goss, Torquay	485	17	6
Friend, Dawlish	495	0	0
Hawkins, Dawlish	494	0	0
Loveys, Dawlish	394	0	0
Early, Dawlish	390	0	0
Cundy & Stoyle, Dawlish (accepted)	365	0	0

Houses, Rosslyn Gardens, Hampstead.—Mr. Stephenson wishes us to say that his tender for all the work which Mr. Russell has contracted for at £3,500 was £3,633, so that he was not the lowest.

Special Notice.—Lists of tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, Strand, W.C., not later than four p.m. on Thursdays.

TO CORRESPONDENTS.

C. C. H.—"Staining and gilding glass" (no name or address on MS.)—J. B.—Artus ("yes," to both questions).—F. H. M. (below our mark)—H. D. M. (not quite within our province).—G. P. B.—J. W.—A. T. (next week).—C. H. H. (next week).

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

PUBLISHER'S NOTICES.

THE INDEX and TITLE-PAGE for Volume XLVI. (January to June, 1884) are given as a Supplement with this Number.

A COLOURED TITLE-PAGE may be had, gratis, on personal application at the Office.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING-CASES (Cloth), with Strings, to hold a Month's Numbers, price 2s. each.

THE FORTY-SIXTH VOLUME of "The Builder" (bound), will be ready on the 16th inst. price Twelve Shillings and Sixpence.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS,

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for Series of Trade Advertisements, also for Special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about THIRTY words) or under ..... 2s. 6d.
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PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to

DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum, PREPAID. To countries within the Postal Union, 26s. per annum. Remittances payable to DOUGLAS FOURDRINIER, Publisher, No. 46, Catherine-street, W.C

SPECIAL.—ALTERATIONS in STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have *Replies addressed to the Office*, 46, Catherine-street, Covent-garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

Best Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down,
And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [ADVT.

Box Ground Stone
Is the Best for Use in all Exposed Positions, being a well-known and tried Weather Stone.
50,000 feet cube in stock.
PICTOR & SONS, BOX, WILTS.
[ADVT.

Doulting Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Doulting Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, 73, Charlotte-street, Portland-place, W. [ADVT.

Doulting Free Stone
HAM HILL STONE,
BLUE LIAS LIME
(Ground or Lump),
For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Stoke-under-Ham, Ilminster. [ADVT.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. [ADVT.

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
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